THE IRON TRADE REVIEW

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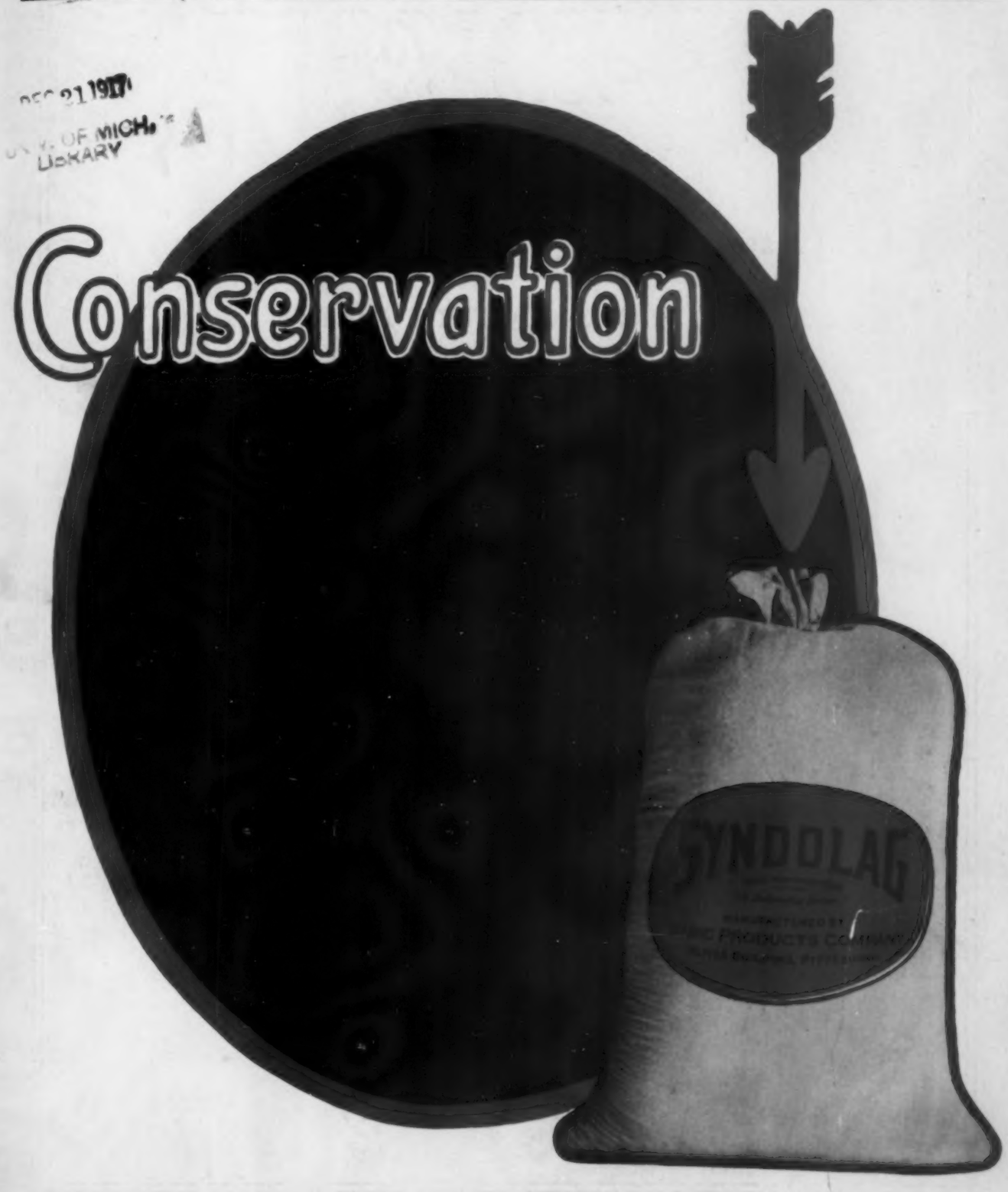

Advertisers' Index, pages 144-145. Contents, page 63. "Where-to-Buy," page 74.
Engineering Directory, pages 112-113. Classified Advertisements, pages 122-143.

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CONSULTING ENGINEERS

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UNION ARCADE BUILDING
PITTSBURGH, PA.

THE IRON TRADE REVIEW

Vol. LXI Cleveland, December 20, 1917 *No. 25*

Revision of Prices Still in Doubt

Early Conviction That No Changes Would Be Made Jan. 1 Modified Somewhat by Later Developments—Wholesale Cost Data Collected from Manufacturers to Determine President's Decision—Curtailed Plants Resuming

WHILE Washington talks steel costs and considers the revision of prices Jan. 1, the industry is struggling to repair productive lines shattered by the recent aggravated stringency in fuel. Attention has been divided between these two paramount factors. The symposium on comparative cost conditions in October and earlier months conducted with the manufacturers the past week by the federal trade commission, has cast no light on the price riddle. It is by no means assured, however, that present schedules will be reaffirmed dating with the new year. More belief to the contrary, particularly on certain basic materials has been expressed during the past week. The President is to consider the submitted data on manufacturing costs in making a decision. Relief gradually is being extended to those producing districts most affected by last week's storm-brought coal crisis. Much production, however, has been and still is being lost. Congestion in the Connellsville coke region has been without parallel and this has been only slightly modified to date. The plan for eliminating cross shipments of coke in the regions still hangs fire.

War Orders Swell Total

November's substantial increase to 77 per cent of capacity, or approximately 138,600 tons in structural awards is explained by the contracts for fabricated steel placed for government ships. The October figures were approximately 61.50 per cent, and 110,700 tons, respectively. The American Shipbuilding Co. has made further liberal allotments to the mills against a requirement of 54,000 tons of plain material for new vessels for the Emergency Fleet corporation. Orders placed in the week totaled probably 20,000 tons. The Submarine Boat Corp. is taking similar action on one hundred 7500-ton boats. Compilation of the government's recent purchases of all classes of rolled steel shows that these have been running at the rate of more than 18,000,000 tons annually. It is, of course, not expected that this high speed of buying activity will continue indefinitely.

Many Stacks Are Banked

Pig iron market conditions repeat themselves each week. It remains impossible for the furnaces to supply buyers with the tonnage or deliveries now desired. This situation has been further intensified by the banking of furnaces during the past 10 days because of coke deficiencies. It is stated that at the present time more furnaces are banked than at any time during this year. The country's shortage of iron now is placed at the annual rate of 3,000,000 tons by a leading authority. Foundry operations are growing more erratic. The tension in steelmaking iron which has been brought out more sharply by increased difficulties in obtaining scrap, is no easier. Practically all the more important steel companies in the middle west continue to be active or receptive buyers of basic and off grades. Few are getting what they want. A new government request for 3000 tons of malleable and foundry for an eastern Pennsylvania consumer is up.

Ore Shows Fine Record

The closing of the season's navigation on the Great Lakes shows that the water movement of iron ore in 1917 reached 62,498,901 tons, against 64,734,198 tons in 1916, the record year, and 46,318,804 tons in 1915. Probably 2,000,000 tons have been moved by rail this year, making total Superior shipments approximately 64,500,000 tons, or only about 3.50 per cent under the 1916 grand total. Nothing tangible as to 1918 ore prices has resulted from further discussions of this matter by operators during the past week.

Agricultural implement makers finally have persuaded the mills to accept their 1918 contracts for steel bars. At Chicago, the leading producer has taken a number of contracts at the fixed price of 2.90c, but delivery is to be made at the convenience of the maker. In northern Ohio, independent mills have quoted 2.90c, Pittsburgh, for first half contracts,

The Iron Trade Review

EDITORIAL

Common Sense and Furnace Problems

COMMON-SENSE is as essential in blast furnace practice as the blast used in smelting the iron. Each day furnace men are confronted with problems, no two alike, which demand immediate action, but in a majority of cases, remain unsolved all for want of a little judgment. In some cases where judgment is deferred, production is noticeably decreased and financial losses accumulate, while if common-sense had been employed at the time the problem arose, these uncalled for conditions easily would have been overcome.

For instance, carbon deposition in the throat of the furnace causes stock to cling to the sides. Charges of coke, ore and limestone tend to increase the height of this formation by building it up. When the formation becomes dislodged, due to contraction, a slip usually occurs ejecting large quantities of coke from the top of the furnace. Part of this is expelled through the bleeder and scattered over the ground; and, part is blown through the downcomers and collected in the dust-catcher. In the course of three or four hours, sometimes sooner, the furnace commences to hang and produces a poor quality and low volume of gas. The steam pressure begins to fall below normal, retarding the speed of the blowing engines and, consequently, the smelting of iron. The equilibrium of the furnace has been destroyed because the stock charged a few hours previously has been robbed of its fuel by a slip.

It is a known fact that when several charges of a furnace burden are only partially smelted on account of lack of coke, an off-cast of iron results. Knowing this, it is beyond comprehension that furnace men still consider slips of no vital importance; their attitude seeming to be that they are not to blame for the slip and that it is not a difficult matter to recharge the coke which was expelled. It is not a question of reclaiming the coke. It is a question of getting coke into the furnace to compensate for the amount blown out and of replacing it *immediately* after the slip occurs.

Coke is charged into a blast furnace for the same reason that coal is put into a hot-air furnace, namely, to produce heat. If coal is raked out of a hot-air furnace immediately after it is put in, no heat is obtained, and the same is true when coke is ejected from a blast furnace when a slip takes place. If the furnace man had used a little common-sense and had charged coke in a proportionate amount to that blown out, the irregular operation of the furnace, in all probability, would have been avoided. This is only one of many instances which might be given to show how valuable an asset common-sense is to the furnace man, and to what great extent it would simplify his problems if used promptly whenever an operating difficulty presents itself.

American and German Records

STEEL ingot production in 1917, as estimated by the American Iron and Steel institute, will be 42,600,000 gross tons. Pig iron output, as indicated by the figures compiled by THE IRON TRADE REVIEW, will be 38,500,000 tons. The former figure will mark the establishment of a new record: The latter will mark a drop from the total pig iron production of 1916.

The ability of the steel industry to make a new production record in the year in which the United States entered the war will arouse greater satisfaction among this country's friends than among its enemies. Germany's steel output sagged heavily after she opened hostilities and yet she had a clearer appreciation than any other nation of the colossal tonnages of iron and steel which modern warfare demands. German "efficiency" could round up an immense, trained army over night, but failed to mobilize simultaneously her industrial forces.

America with an army to find and equip, and with the handicaps which her inexperience and unpreparedness entailed, was able at the same time to keep her steel furnaces in operation and to surpass her 1916 mark—itself a record. The decline in pig iron output from 1916 is comparatively slight and is due to the difficulties met in assembling raw materials.

The year's record in pig iron and steel ingot production inspires confidence in the future. Germany's steel industry, when pitted against America's, is fighting a losing battle.

Saving the Men Behind the Line

ANYONE in Washington at night under present conditions must be impressed by the fact that there are no limited day schedules in effect in the capital city. The whirling, restless energy of the day which now marks the nation's seat of war preparations is being carried far into the night. Few are the public lighted buildings that do not flash out from their brilliantly windows, the message that those who are charged with the responsibility for the planning

The Iron Trade Review
EDITORIAL

and the execution of the greatest enterprise in the country's history are applying themselves feverishly to their tasks. These nights usually follow days of endless conferences and interviews which leave little time for thoughtful initiative.

That the work of these war executives is arduous and is taxing greatly their mental and physical powers is a natural consequence of the tension under which they are obliged to labor. To serve their country in its hour of trial, when speed is the watchword of the great war machine now in the making, many of these men are giving the utmost and a little more of their endurance. Some of them are of an age where they can ill afford to undergo the strain to which they are subjecting themselves. Even the constitutions of those of more robust years are crumpling under the terrific crush of detail and responsibility. More instances of this kind are likely to appear before the complex war organization required in the present emergency is functioning smoothly.

Under all circumstances, it seems unavoidable that the burden of war management should fall upon a comparative few. If that be true, there is some duty upon the rest of the citizenship to see that these men are spared and their strength is succored wherever possible. It would seem that it is equally as important to safeguard the health and vigor of the managers of war as it is the life and safety of the generals in battle. Men of affairs must go to Washington to consult and advise with these in directing positions as to the proper courses of action in different situations. That is essential to the realization of the best that the country affords in brain power and applied skill. But a proposition little more thoroughly worked out as more closely in hand before an interview will save valuable minutes of a very busy official, perhaps render a personal meeting unnecessary, and what is more, spare the latter's physical and mental strength. The business man who is in the habit of dashing to Washington these days whenever he has a complaint to air or a wire to pull, owes it to the country to decide carefully whether that trip is essential to the success of the war. After all those whose time he would be taking and for whom he would be multiplying cares, are working for his future no less than for every other citizen of the nation. The war executives are in conference for a definite purpose and not to render consulting advice in solving the ordinary business problems of others.

As for those who have no real business in Washington these days—well, they were worse than in the road at present.

No Time to Muddle Along

IN HIS testimony for the senate committee on naval affairs last week, General Crozier, chief of the ordnance bureau of the war department, explained the slowing down in rifle production by pointing out that manufacturers were unable to maintain their organizations of skilled workmen intact last spring during the period of idleness between the expiration of the English and French contracts and the commencement of work upon new orders for our own army. The general's explanation undoubtedly is correct as far as it goes. In fact, as stated on page 1335 of this issue, this situation was foreseen by responsible ordnance manufacturers as early as last March.

The chief point of interest in the rifle situation at present is not just what caused the shortage, but why. When the situation was clearly foreshadowed steps were not taken by those in authority to prevent the depletion of the working forces of rifle-making factories.

General Crozier says this would have necessitated keeping a very considerable number of men on the payrolls with nothing to do. He adds that the department tried this procedure in a limited manner and was severely criticized for it. It should have been. Paying rifle-making crews to do nothing in time of war is a serious matter and breeds laziness. When an increased production is required later, the crews are sluggish and feel that the government is imposing a hardship upon them.

From the viewpoint of the experienced business man it would seem that the ordnance bureau was at fault in not having its plan in such shape that work could have proceeded without interruption or delay. The question naturally arises why almost invaluable producing organizations should have been allowed to disintegrate, while debates were held as to the type of rifle to be employed in our army. This point seems to have been entirely overlooked in the testimony before the senate military affairs committee.

Now the question naturally arises whether the war department and the ordnance department in particular is not overburdened. Early in the war England found it necessary to radically reorganize her army supply systems through the creation of a ministry of munitions with a civilian head which has come to be controlled more largely by business than by military methods. Might we not profitably follow the example of our cousins across the water, who have tried their methods in the crucible of fire?

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 1356

PIG IRON

Bessemer valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pa.	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	37.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern).....$33 furnace base
2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern)..... base plus 50c
2.75 to 3.25 silicon (No. 1X, No. 2 soft).....base plus $1.50
Over 3.25 silicon..... $34.50, plus $1.00 for each ½ per cent of silicon.

No. 1X, Phila.	35.00 to 35.25
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.00 to 34.25
No. 2X foundry, N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.50 to 33.75
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern, Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos. Lebanon furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern, furnace	43.00

COKE

(At the ovens.)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Wise county furnace	6.00
Wise county foundry	7.00
Pocahontas furnace	6.00
New River foundry	7.00
New River furnace	6.00

FERRO ALLOYS

Ferromanganese delivered	$250.00 to 255.00
Spiegel, 20 per cent fur.	60.00 to 62.00
Ferrocarbon titanium, carloads, maker's plant	160.00
Ferrosilicon, 50 per cent, Pittsburgh	175.00
Ferrosilicon, 50 per cent, Pitts., 1st quarter	160.00 to 170.00
Bessemer ferrosilicon, 9 per cent.	$51.70
Bessemer ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS

Open hearth, Pittsburgh	$47.50
Open hearth, Philadelphia	50.50
Open hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open hearth, Pittsburgh	$51.00
Open hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pitts.	2.90c
Sheared skelp, Pitts.	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chicago.	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia.	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Philadelphia	3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.25c
Cotton ties, Pitts., Dec.	$2.17

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh, base	3.75c to 4.00c
Angle bars, Chicago, base	3.25c to 4.00c
Standard bessemer rails, mill	$38.00
Stand open hearth rails, mill	40.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	75.00 to 80.00
Spikes, railroad, Pittsburgh	4.50c to 5.00c
Spikes, railroad, Chicago	5.00c to 5.25c
Track bolts, Pittsburgh	6.50c to 7.00c
Track bolts, Chicago	5.25c to 6.50c
Tie plates, Chicago	$70.00 to 75.00

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.85
Galvanized staples, Pittsburgh	4.35
Barb wire, painted, Pittsburgh	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	....

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts. 8.00c
Sheet piling, base, Pittsburgh 4.00c to 5.00c
Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

Market Report Index

	Page
Weekly Market Review	1303
Pig Iron	1307
Coke	1309
Scrap	1310
Iron Ore	1311
Bars	1312
Warehouse	1312
Nuts, Bolts, and Rivets	1312
Sheets	1313
Tin Plate	1313
Wire	1313
Structural Shapes	1314
Plates	1314
Ferroallays	1315
Merchant and Cast Pipe	1315
Semifinished Steel	1315
Nonferrous Markets	1318
Refractories	1339
Coke By-Products	1389

SHEETS

(In cents per pound.)

SHEET MILL BLACK

No. 28, open hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open hearth, Chic.	5.215c

TIN MILL, BLACK

No. 28, open hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open hearth, Chic.	6.465c

BLUE ANNEALED

No. 10, open hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open hearth, Chic.	5.715c to 6.215c
No. 10, open hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pittsburgh.....$7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black Per cent off	Galv. Per cent off
⅛ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	.30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe.)

Four-inch, Chicago	58.50
Six-inch and over, Chicago	55.50
Four-inch, New York	57.50
Six-inch and over, New York	54.50
Four-inch, Birmingham	48.00
Six-in. and over, Birmingham	45.00

Class A pipe is $1 higher than Class B.

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pittsburgh, carloads	17 off to list

RIVETS

Structural rivets, Pittsburgh	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. and smaller, Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius.)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semi-finished hexagon nuts ⅝ in. and larger	60–10–10 off
Cold pressed semi-finished hexagon nuts ⅝ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products December 19, average for November 1917, average for September 1917, and average for December, 1916. Prices are those ruling in the largest percentage of sales at the dates named

	Prices Dec. 19, 1917.	Average prices Nov., 1917.	Sept., 1917.	Dec., 1916.
Bessemer pig iron, Pittsburgh..	$37.25	$37.25	$48.27	$35.95
Basic pig iron, Pittsburgh.....	33.95	33.95	43.95	30.95
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	48.95	31.70
*No. 2 Foundry pig iron, Chic.	33.00	33.00	49.50	29.25
Lake Superior Charcoal, Chicago	37.50	37.50	59.50	32.00
Malleable, Chicago	33.50	33.50	49.50	29.25
**Southern, No. 2, Birmingham.	33.50	33.50	43.50	23.00
*Southern Ohio No. 2, Ironton.	33.00	33.00	49.50	30.00
Basic, eastern Pa.....	33.00	33.00	49.50	30.00
**No. 2X Virginia, furnace....	33.50	33.50	50.75	26.00
**No. 2X foundry, Philadelphia.	34.00	34.00	53.25	29.50
Ferro mang., delivered.....	250.00	247.00	378.00	160.00
Bessemer billets, Pittsburgh....	47.50	47.50	73.75	58.75
Bessemer sheet bars, Pittsburgh	51.00	51.00	82.50	58.75
Open hearth sheet bars, Pitts..	51.00	51.00	82.50	58.75
Open hearth billets, Pittsburgh.	47.50	47.50	73.75	58.75
Steel bars, Pittsburgh.....	2.90	2.90c	3.725c	2.925c
Steel bars, Chicago.....	2.90	2.90c	4.10c	3.10c
Iron bars, Philadelphia.....	3.685	4.335c	4.935c	3.059c
Iron bars, Cleveland.....	3.64	4.00c	4.50c	3.00c

	Prices Dec. 19, 1917.	Average prices Nov., 1917.	Sept., 1917.	Dec., 1916.
Iron bars, Chicago mill.....	$3.50	4.10c	4.50c	2.85c
Beams, Chicago	3.00	3.00c	4.46c	3.20c
Beams, Pittsburgh	3.00	3.00c	3.75c	3.025c
Beams, Philadelphia	3.185	3.185c	4.435c	3.409c
Tank plates, Pittsburgh.....	3.25	3.25c	6.8125c	3.525c
Tank plates, Chicago.....	3.25	3.25c	7.33c	3.75c
Tank plates, Philadelphia.....	3.435	3.435c	7.75c	4.159c
Sheets, blk., No. 28, Pittsburgh	5.00	5.30c	8.75c	4.50c
Sheets, blue anld., No. 10, Pitts.	4.25	4.60c	8.50c	4.00c
Sheets, galv., No. 28, Pittsburgh	6.25	6.50c	9.6875c	6.25c
Wire nails, Pittsburgh.....	3.50	$3.50	$4.00	$3.00
Connellsville fur. coke.....	6.00	6.00	9.625	4.44
Connellsville fdy. coke.....	7.00	7.00	12.50	6.00
Heavy melting steel, Pittsburgh	30.00	29.60	35.50	25.00
Heavy melting steel, eastern Pa.	29.00	27.50	31.25	24.00
Heavy melting steel, Chicago...	28.50	28.50	32.65	23.35
No. 1 wrought, eastern Pa.....	35.00	35.70	44.50	27.00
No. 1 wrought, Chicago, net ton	31.00	30.60	36.25	25.35
Rerolling rails, Chicago.....	35.00	35.70	41.25	29.50
Car wheels, Chicago.....	29.00	27.50	31.00	21.85

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

(For Additional Prices See Page 1356)

Many Blast Furnaces Still Banked

Larger List of Plants Off Production Temporarily at Present Than at Any Time This Year—Steel Makers Continue to Scour Market for Metal—Scarcity of Supplies Remains Unusual

Pittsburgh, Dec. 18.—Makers of pig iron say that there is a larger number of blast furnaces banked at present than at any previous time during the current year. This is due to the shortage of coke. Shipments enroute to the consumers are large and will be moved as quickly as more favorable weather conditions permit. Great relief and an increased output of iron would follow. The congestion of traffic and lack of cars in the Connellsville coke region is extremely serious, however, and there is no immediate prospect that operations will be restored to anything like normal capacity. Railroad embargoes also are a source of considerable annoyance. By reason of these and despite the heavy demand for pig iron, tonnages are being piled in some furnace yards. Producers in the valley districts are practically sold up for first half and tonnages booked during the past week for prompt delivery were either of a resale character or were supplied to regular customers to meet pressing war requirements. There has been probably 4000 to 5000 tons of foundry iron sold the past few days in the valleys district for second quarter delivery. A nearby furnace disposed of 2500 tons of resale basic. A subsidiary of the United States Steel Corp. has bought 1700 tons of off gray forge iron from a nearby furnace.

Hard to Get Iron Through

Boston, Dec. 17.—Conditions in the local pig iron market have not changed greatly since a week ago. There is still a rather good inquiry but sales continue restricted by the fact that there is very little iron available for prompt or first quarter delivery. The inquiry exceeds the supply and in view of the fact that some sellers report calls from buyers with whom they have done almost no business for some time past, it is evident that the furnaces which these people have been trading with are out of the market. The matter of getting iron here on contracts placed some time ago is occasioning some concern owing to the recent stormy weather. A local agent just back from Pennsylvania says everything in the iron regions is piled up. The railroad situation not only is bad as far as shipment of iron this way is concerned, but also in the matter of getting coke to the furnaces. The word from all northern sections is that many which had kept going have been forced to bank during the past week. Some business for the last half of 1918 is reported in Everett by-product oven coke on the government price basis. New England foundries are believed to be well covered for the first half of 1918. The New England Gas & Coke Co. is coming in for praise among the iron men for the way it has stood in the breach in the matter of coke supplies. Foundries in this section and some outside have found this maker ready to supply coke and it has not mattered whether the buyer was a regular customer or not.

Sales Are Limited

New York, Dec. 18.—Sales of pig iron in this district have been rather limited during the past week by reason of the tremendous bookings of the furnaces, which prevent them from taking on additional tonnage. Inquiry has involved a large number of lots in excess of 1000 tons and the greater proportion of nearby consumers want small tonnages for

early shipment. Disposition of the furnaces to take on no more tonnage was especially emphasized during the past week by the severe weather which in most cases resulted in curtailed production. The American Locomotive Co. is in the market for 2900 tons of foundry, for its Richmond plant, for first half delivery. Among current export inquiries is one for 12,000 tons for Italy.

Furnaces Almost Idle

Buffalo, Dec. 18.—Conditions indicate that the country is in straits in pig iron and that so far as this district is concerned it will be practically impossible to get metal on new orders this side of July 1. Producers now are most concerned with getting out production. Storm conditions have been such during the past few weeks as to cut down the supply of fuel and to seriously curtail production. These conditions have set at least one interest behind on its delivery and furnacemen generally express no disposition to take advantage of the really splendid inquiry because they cannot yet see daylight. No furnace has moved anything in this district during the past week. Some furnaces barely were kept running. One interest which has already banked a furnace recently stated that another might be added to the idle list shortly if the coke supply did not show improvement. There is hope that the coke situation soon will improve as it had begun to do, previous to the last tie-up. The only interest to do important business during the past few days disposed of 2000 tons.

Steelmaking Iron Scarce

Cleveland, Dec. 18.—Scarcity of steelmaking iron remains widespread and practically every plant is a receptive buyer. Off grades also are being taken wherever available. Those works suffering from both shortages of iron and scrap include some of the most important interests. The latter are not actually in the market with inquiries, but they have made it known that they are interested in any lot that may be made available to them. In addition, several open-hearth plants continue openly in the market with unclosed inquiries for basic which have been pending for several weeks. They have not been able to find the iron to fill their needs. The Brier Hill Steel Co. has closed further basic orders with valley makers, increasing its recent purchases to 22,000 tons for 1918 delivery. Inquiry for other grades is fairly good, but scarcity of supplies precludes much selling. There have been a few additional lots of foundry closed for the last half of 1918 at current prices and new inquiry for that period is growing. The government placed 200 tons additional of foundry iron in this territory this week and is about to call for 3000 tons of malleable and foundry for December-March delivery to the Westinghouse Electric & Mfg. Co. plant at Essington, Pa. Lots of 200 tons and 400 tons recently asked for have not been closed. Operating troubles are general with both producers and consumers of iron. The Toledo furnace which was banked last week again is running. Foundries are having trouble to get any ample supplies of iron and coke and are running at only partial capacity.

Consumption Leads Production

Cincinnati, Dec. 17.—No encouragement is afforded melters in the small improvement in shipments from the furnaces. What is now looming up strong is the doubtful chance of getting future supplies. Competent authorities state that while the consumption of iron is in the lead of production, that early after the first of next year it will be phenomenally greater. The coke shortage has cut down the melt of iron, but proportionately it is now reducing the production to a much greater extent. Complaints are frequent that shipments of foundry iron from the south are very far behind schedule, and substitution of odd lots of off iron that can be picked up in different producing is a frequent occurrence. Virginia furnaces are supplying part of this emergency iron, but practically none is to be had in southern Ohio. Basic iron is becoming much scarcer, although a few melters in this territory lately have been drawing from the Birmingham district. One basic contract is said to extend into the last half of 1918. Not much foundry iron has been sold for that shipment.

Tonnage Hard to Buy

Chicago, Dec. 18.—With considerable inquiry current, northern makers of pig iron announce they have sold their entire production until the middle of 1918 and are able to supply only occasional small lots of special analysis. Not only do contracts cover probable production but all off iron made as the result of poor fuel conditions has been sold and there is no accumulation of this sort. Malleable users apparently are in need of considerable more iron for first half operation than they have been able to contract. More than 10,000 tons is covered in four inquiries now current, one of them being for 4000 tons and all for first half delivery. Just where these interests will be able to obtain iron is difficult to see. With one possible exception, makers of southern iron are out of the market and will not take further contracts at present. This does not mean necessarily that all have sold their output to the middle of the year but rather that they are uncertain as to their fuel supply and will not obligate themselves further until the situation is clearer. One large southern maker authorizes its agents to take contracts up to 1000 tons for any delivery in 1918 without submitting to the home office, but larger tonnages must be approved before being placed. Lake Superior charcoal iron producers apparently have sold their entire production to the middle of 1918. Although some business has been placed with them during the past week. Both charcoal iron producers and northern stacks are willing to book business for last half of 1918 and some of this has been done though it has not developed into a definite buying movement.

Basic Tonnage Distributed

St. Louis, Dec. 18.—Aside from the purchase by the Scullin Steel Co. of 20,000 tons of basic, there has been virtually no incident worthy of note in the St. Louis pig iron situation during the past week. The Scullin tonnage was bought from two Chicago furnaces and is for delivery over the first half of next year. Dealers report an aggressive demand for all grades, much of which is from territory which has heretofore not figured as a buyer here. It would be possible to do a large business but for inability to get the iron to sell. Furnaces to the south are offering nothing for spot shipment and little for early 1918. Producers in the St. Louis district are entirely sold up for months. There were numerous complaints of backwardness of deliveries on contract, due in a large measure to the blizzard and consequent railroad congestion. Thus far, however, no plant of size has been obliged to curtail activities though unless things change by the end of next week surplus material with several important melters will have been entirely used up. Among the inquiries heard of during the week were one for 5000 tons from Iowa and one for 3000 tons of foundry from Indiana. An east side mill is out for 10,000 tons of basic and a stove manufacturer for about 2000 tons of No. 2 southern foundry for delivery

by the end of January. The scarcity of high silicon continues acute.

Southern Sales Moderate

Birmingham, Ala., Dec. 18.—With no effort being made to get business and all attention being directed to production and delivery, only sales in small lots are being made by southern iron producers. The make has been much improved recently and there is hope that the December output will exceed the estimates of a few weeks ago. New inquiries are numerous but there is only a certain amount remaining of the probable make of the first half of 1918 and efforts are being made to distribute this to regular customers and to those to whom delivery can be assured. Railroad car shortage and embargoes are the general cause of trouble. The furnaces admit making few sales for the last half of 1918 though many inquiries are being received for that period. The Sloss-Sheffield Steel & Iron Co. will repair its No. 1 Hattie Ensley furnace at Sheffield and is making iron with the new furnace at that place. The No. 2 furnace is equipped with modern appurtenances and should be able, when in full blast, to produce not less than 275 tons daily. A little reduction is noted in home consumption. Soil pipe plants now closed down and other industries are not as actively engaged. It is not likely there will be much banking of furnaces in the Birmingham district during the holiday season.

May Build Blast Furnace

The Old Forge Iron & Steel Co. recently incorporated at Wilmington, Del., is planning to develop Kentucky ore lands and to manufacture pig iron. A portion of the company's holdings was worked several years ago. Assays made at that time by the Kentucky geological survey are said to have shown that the ore, which is limonite, contained 56 per cent iron. Recent essays made by the company are reported to show approximately the same results. The company states that it plans to produce pig iron low in sulphur and phosphorus, and containing from 3.50 to 3.75 per cent silicon and about 0.75 per cent manganese. This property is located on the Cumberland river, making water transportation possible.

R. O. Smith, 3420 Washington avenue, St. Louis, secretary, says that the company's plans are not yet completed. At present it is considering the erection of a blast furnace with a daily capacity of 100 tons. Other installations may be made later.

Coke Congestion at Worst

Conditions in Connellsville Region Past Week Without Parallel—Some Improvement Since But Situation is Exceedingly Serious

Pittsburgh, Dec. 18.—No improvement has been shown during the past week in the Connellsville coke region where there is an extreme shortage of cars and serious congestion of traffic. The situation in the Connellsville region last week was perhaps the most serious of the current year. The car supply averaged exceedingly low and the congestion was severe. These conditions were accentuated as a result of the recent blizzard. They followed immediately upon the heels of an improvement both in the way of increased shipments and relieved congestion which had given promise of better blast furnace operation than for some time. The situation today, operators and consumers believe, calls for quick and sweeping action. Priority orders issued by the government from time to time have brought no appreciable relief. As yet the plan to eliminate cross shipping has not been invoked. Steps toward this end are progressing well and it is hoped that the system will be in operation soon, and that it will afford satisfactory results. The feeling exists, however, that an order should be issued by the government guaranteeing an adequate car supply and making provision for reducing the congestion. The shortage of coke has forced additional furnaces to bank and unless an effective remedy is found at once, still more of them will be made idle. The car supply in the Connellsville region on Monday of the present week was 45 per cent, today it was 30 per cent and tomorrow 40 per cent is promised. Production for the week ending Dec. 8 was 307,903 tons as compared with 295,316 tons for the preceding week, according to *The Connellsville Courier*.

Conditions are Unparalleled

Cincinnati, Dec. 17.—No worse condition ever prevailed as far as supplies of both furnace and foundry coke are concerned. The car supply is so limited that there is a scramble on the part of oven operators to pick up any kind of equipment. The furnace coke situation is growing more acute, while the foundries are also uneasy and are by no means assured that they can continue operating throughout the present month. Reports received from selling agencies are not very encouraging as to labor. Already many workmen are laying off for the holidays and it may be later than usual before they can be persuaded to return to work after the yuletide season. The unreliability of labor is further emphasized by its migratory character at the present time. A moderation in the weather has only contributed in a small measure to alleviating shipping conditions.

Shortage Becomes More Acute

St. Louis, Dec. 18.—Near-zero weather throughout this general region has served during the past week to render more acute an already stringent coke situation. Trains have been hopelessly delayed, and even cars which reached St. Louis terminal tracks have been held up days because of the congestion. Stocks on hand have tided over the principal melters and there have been no cases of actual suspensions. A saving factor, also, has been the big coking plant of the Laclede Gas Light Co., which has been producing at full capacity, and has been using its metallurgical surplus to supply acute needs in surrounding territory. Dealers report the demand astonishingly heavy and still broadening. A plant at Buffalo inquired for 1000 tons and offered special inducements. There were also inquiries from points in West Virginia and one from Rhode Island.

Southern Situation Muddled

Birmingham, Ala., Dec. 18.—Coal production in Alabama is being muddled up somewhat by federal administration giving instructions as to emergency deliveries. The output of coal in all directions shows an increase. Considerable satisfaction is felt over announcements that agreement has been reached between representatives of the miners and operators who went to Washington for a conference. The union miners will hold a convention here Thursday to ratify or reject the agreement. Coke production shows a little reduction and manufacturers say that this is caused by uncertain coal supplies. No new contracts are being made for coke though some early sales are being closed. Furnace companies are being supplied where purchases are made on the open market as promptly as possible. Foundries and machine shops in some instances are begging for coke in small lots.

Consumers Snap Up Scrap

Limited Supplies and Restriction of Offerings to Local Markets by Reason of Fixed Prices Raise Problems for Buyers

(FOR COMPLETE SCRAP PRICES SEE PAGE 1356)

Chicago, Dec. 18.—Acute shortage of scrap iron and steel is being experienced in the Chicago market and consumers are ready to take whatever can be offered. Dealers state that it is practically impossible to buy car wheels, which ordinarily can be obtained in large tonnages. It appears that most of this material is being disposed of on exchange contracts and that whatever wheels appear are taken at once for use in place of pig iron. It is said that only one lot of 500 tons has appeared on the Chicago market in the past 75 days. The quotation at Pittsburgh on car wheels now is reported to be $35 per gross ton. Knuckles, couplers and springs also are extremely scarce. The largest user of steel scrap in open-hearth operations is said to be in the market for all the tonnage available and that sales can be made by any dealer who has any heavy melting or shoveling steel to offer. It appears that this company started buying at about $27 for heavy melting steel and now is up to $29 for heavy melting and shoveling steel. It seems probable that $30 will be reached shortly. Probably when this maximum level is being paid, more scrap will be offered. Railroad offerings are extremely small and the only list now current is 100 tons offered by the St. Joseph & Grand Island.

Supplies Can't Be Had

Boston, Dec. 17.—There has been no particular change in the market for old material. There is no disposition on the part of the local trade to depart from the price levels fixed by the government, though on a supply and demand basis the market undoubtedly would be higher. There is still a keen demand but only moderate supplies, for the railroad situation is worse rather than better, and dealers have great trouble in moving what they pick up in interior points. Wholesale dealers' paying prices per gross ton f.o.b. shipping points follow: Wrought No. 1 long, $28 to $29; horseshoes, $28 to $29; cotton ties, $20 to $21; stove plate, $19 to $20; No. 1 machinery, $30 to $30.50; No. 2 machinery, $28 to $29; car axles, steel, $42 to $44; iron, $49 to $50; relaying rails, $50; rerolling rails, $35; iron boiler plate, $34 to $35; bundled barrel hoops, $17.50 to $18; wrought iron pipe, $24 to $25; steel rails, $25 to $26; No. 1 railroad steel, $25 to $26; heavy melting steel, $25 to $25.50; axle turnings, $18 to $19; machine shop turnings, $15 to $16; cast borings, $17 to $17.50; drop forge trimmings, $21 to $22; cast iron car wheels, $30 to $32.

Pittsburgh Shortage is Acute

Pittsburgh, Dec. 18.—With the output of pig iron further curtailed through the banking of additional furnaces on account of the recent blizzard, the demand for scrap has become increasingly heavy. It appears now that the point almost has been reached where the shortage of scrap in this district is as acute as the shortage of pig iron. The demand for heavy melting steel is particularly insistent. Dealers say that their stocks have been depleted and that it is impossible to obtain sizable shipments. They claim that railroad embargoes make it extremely difficult to secure supplies and that another problem is brought about by government regulation of prices. It is pointed out that the demand for scrap is active in all districts, and that the natural tendency is for material to move from points of origin to the nearest points of consumption, inasmuch as the prices are f.o.b., consuming points. Sales of heavy melting steel, No. 1 railroad wrought, machine shop turnings and cast borings, when made, go at the prices fixed by the government, while other grades are sold at conforming levels.

Expect Further Revisions

Buffalo, Dec. 18.—Dealers are beginning to see their way after storm conditions of the past week had effectually tied up business in scrap iron. The situation was about as tight as it could be for a period of several days when no shipments came in or went out of the city. Buffalo has been under an embargo from the west on account of storm conditions. The market is getting stronger each day. The shortage of pig iron has caused a greatly increased demand for cast scrap. Machine shop turnings and cast borings also are strongly in demand. In fact the entire list is active with the inquiry for heavy melting steel so brisk that dealers believe the price could touch $50 very speedily if the government price restrictions were removed and this material marketed without restraint. Adjustments are believed to be coming on bundled sheet scrap, compressed steel, heavy turnings and No. 1 busheling scrap which are now selling very close to the government's fixed price on heavy melting steel. The scarcity of the leading scrap grade has led to the demand for these classes, and it is believed the government has revisions seriously under consideration. The price adjustments which dealers believe are coming have not had the effect of the previous revision. Every dealer is practically sold out.

Cleveland Demand Strong

Cleveland, Dec. 18.—Demand for practically every grade of iron and steel scrap is extremely active in the Cleveland district. Any dealer reports he could sell upwards of 10,000 tons of an afternoon, if he had it. Scrap is as hard to get from originating points as it is to buy, and dealers are taking few chances on running short. The principal factor in the shortage just now is lack of cars and motive power to move the former after they are loaded. The entire list of quotations is strong. For the first time in this territory the four principal grades on which prices were set by the government, which have been just under the government level, are quotable on the market at the government limits—heavy melting steel at $30, No. 1 railroad wrought at $35 a gross ton; and cast borings and machine shop turnings at $20, all per gross ton. The indications are they would be higher if the law allowed.

Distant Shipments Barred

Cincinnati, Dec. 18.—Business is almost at a standstill. One prominent dealer states that he is getting a good call for foundry scrap from nearby melters but that shipments to any distant points are almost an impossibility. Prices are a trifle firmer on cast scrap, but no advances have been made. The foundries are still unable to use any larger quantities of scrap for the want of high silicon iron for use in their mixtures. Borings and steel turnings would bring higher prices but the nearby consumption of this class of scrap is not large, and shipments to consuming points are practically out of the question during the present embargoes.

Difficulties Are Numerous

Birmingham, Ala., Dec. 18.—The railroad car situation, causing trouble

both in bringing on and in shipping scrap outside the home territory, has brought uncertainty to the old material market in the south. Inquiries are being received from other districts but it is not possible to have transportation guaranteed and for that reason there is difficulty in handling the business. Quotations are changed but little. Offers of consumers in the home territory still are considerably below the prices fixed by the government on heavy melting steel and other grades. It continues to be intimated they are being accommodated at their own price. Representatives of scrap dealers are visiting the St. Louis and Chicago markets looking over the situation and seeking co-operation among consumers to get better railroad service. Nothing definite has come from the appeal to the national organization of the scrap dealers. Better supplies of country scrap are in sight but the transportation cannot be assured.

Market is Picking Up

St. Louis, Dec. 18.—Scrap dealers report signs of returning activity. Quite a number of the consumers were in the market this week for small tonnages and indications are that things will open up after the holidays. Not sufficient business was actually done, however, to effect any variation in prices, which remain stationary as compared with the previous week. Deliveries in the district have been slowed down, due mainly to railroad congestion caused by the blizzard.

Railroads Sell Direct

Philadelphia, Dec. 17.—One effect of the recent fixing of government maximum prices on heavy melting steel, No. 1 railroad wrought and cast borings and turnings has been to greatly decrease the amount of railroad scrap handled by dealers. Before the application of price regulation, a large portion of the railroad scrap offerings were purchased by the brokers, now that maximums have been established, the scrap in almost all cases is being sold by the roads direct to consumer. This departure is reflected in all four grades, but particularly in No. 1 railroad wrought. The brokers no longer figure in this business, since the willingness of the mills to pay the maximum of $35, delivered, makes it impossible for the brokers to buy at a price which would yield a profit. Outside of active demand for No. 1 railroad wrought, the market is quiet. Business has been interfered with by the severe storm last week.

Ore Prices May Be Fixed

Some Action is Expected at Washington Before Jan. 1 in Setting 1918 Quotations—Ore Movement in 1917

Cleveland, Dec. 18.—With the 1917 ore season practically closed, ore operators and ore consumers are taking a keener interest in 1918 prices. Some definite action in fixing the price of iron ore for next year is expected within the next two days. This view is based upon the announcement, made when the first prices for iron and steel were set, that the quotations would remain in force until Jan. 1, 1918.

Some independent operators are known to favor an increase, based upon the increased cost of mining ore. Since ore prices were established in November, 1916, for 1917 delivery, three 10 per cent wage increases have been given to the miners. Coal costs have risen on an average of about $1 a ton. Increased prices are being paid for all classes of mine supplies. Freight rates are higher and labor is scarce and less efficient. When 1917 ore prices were established in November, 1916, bessemer pig iron was selling at $30 a ton, valley, and the rise to $55 before the government price of $36.30 was set, brought no increase in ore quotations. These conditions sum up the views of various independent operators.

Any action which the government may take in regard to ore prices will be universally supported. The uncertainty now prevailing has restricted sales of ore for 1918 delivery, and only a few lots of special analysis ore have been contracted for.

1917 Ore Shipments

Lake shipments of iron ore in 1917 were 62,498,901 gross tons. In 1916, the lake shipments were 64,734,198 gross tons. The decrease this year amounts to 2,235,297 gross tons or 3.45 per cent.

The total is ample to assure blast furnaces receiving sufficient ore to carry them through the winter season when navigation is closed. The minimum had been set at 60,000,000 gross tons and in view of the serious delays imposed by ice at the opening of the season, the impression was general throughout the summer that the lake fleet could not move a larger tonnage. On June 1, the 1917 shipments were 3,500,000 tons behind those to June, 1916. Shipments during June, July and August cut down this handicap but much ground was lost through delays at unloading docks in September and October. In November, however, the lake fleet broke all records for that month, while December shipments were close to last year's mark despite the early appearance of freezing weather.

Coupled with an all-rail movement of 2,000,000 gross tons, the total shipments for 1917 will approximate 64,500,000 gross tons against 66,658,466 gross tons in 1916.

Comparative iron ore shipments for December, 1917, and December, 1916, and for 1917 and 1916 seasons follow:

Port	December, 1917	December, 1916
Escanaba	155,984	177,545
Marquette	9,932	37,640
Ashland	94,362	122,629
Superior	209,308	160,573
Duluth	296,802	382,604
Two Harbors	145,087	204,909
Total	911,475	1,085,900
1917 decrease	174,425	.....

Port	Season, 1917	Season, 1916
Escanaba	7,156,854	7,457,444
Marquette	3,207,145	3,858,092
Ashland	7,597,841	8,057,814
Superior	13,978,741	12,787,046
Duluth	20,567,419	21,837,949
Two Harbors	9,990,901	10,735,853
Total	62,498,901	64,734,198
1917 decrease	2,235,297	.....

Lake shipments by years since 1906 are as follows:

Year	Gross tons
1917	62,498,901
1916	64,734,198
1915	46,318,804
1914	32,021,897
1913	49,070,478
1912	47,435,777
1911	32,130,411
1910	42,628,758
1909	41,683,599
1908	25,427,094
1907	41,290,709
1906	37,513,589

Breaks Output Record

Pressure attendant upon the turning out of government work has led to the establishment of a production record by the Baldwin Locomotive Works, which far exceeds anything in the previous history of the company. During the week ending Oct. 20, the company turned out 72 locomotives. This is at the rate of more than 3600 a year, which compares with the production of 1989 for 1916, and 2666 in 1906, which was the previous record year.

Take Implement Contracts

Bar Makers Sell Tonnage for First Half and for Delivery at Convenience at 2.90c—More Bessemer Offerings

Chicago, Dec. 18.—Agricultural implement makers are placing contracts with the leading interest for bars at the government price of 2.90c, Chicago. These bars are to be delivered at the convenience of mill, without any promise being made as to when they will be available. Agricultural implement makers find they are facing a heavy demand for their product and as the government has asked for as much assistance as possible along this line, the mills are using every effort to supply the material. Other consumers are being given small contracts for delivery at convenience, but specifications must accompany the order. The leading interest is suffering from shortage of pig iron, which is said to be about 2000 tons per day. Specifications are being filed in increased volume and government orders are being distributed at a heavier rate than formerly. Bar iron makers are taking some business for first quarter delivery and some spot tonnages of small size. Consumers are not hurrying to cover their requirements as the price has been fixed and they feel there is no necessity for haste. Heavy demands for iron used in building government transport wagons were largely filled from regular contracts and did not bring as much new tonnage into the market as had been expected. Hard steel bars continue to be booked at 3.25c, Chicago mill, although the impression gains strength that the agreed price probably will be 3c, Chicago mill. There is considerable shortage of rails from which to roll these bars, and most mills are operating at less than capacity. Apparently consumers will not buy largely until a price is fixed.

Implement Makers Quoted

Cleveland, Dec. 18.—Implement makers in this district who have been inquiring for 1918 contracts have been quoted at 2.90c, Pittsburgh, for first half by some producers. This quotation is on mixed lots of bessemer and open-hearth steel, with the former predominating. No contracts yet have been taken. Other bar buying has been in sight but the placing of one requirement of 2000 tons is being delayed. There have been some requests from consumers for modifications of long-standing specifications in order to conform to government requirements, and these adjustments are adding to the troubles of the mills. Reinforcing bars still are unfixed as to price, but there is more talk that the agreed level may be 3c, mill, with no twisting or carbon extras.

Selling Certain Sizes

Buffalo, Dec. 18.—There has been quite a number of inquiries and some sales for restricted sizes of steel bars in this district. The government is taking large tonnages of plates and shapes from local makers with the prospect that after the first of the year there will be an even heavier demand for them.

Bookings Permit Few Sales

Pittsburgh, Dec. 18.—No offerings of soft steel bars at the government price of 2.90c, Pittsburgh, are being made by mills to domestic consumers for prompt shipment. Producers say their output is entirely taken up for some months ahead. Demand for steel bars as well as for iron bars is quiet. Makers of agricultural implements appear to be sounding out the market but are not making pressing demands. They are fairly well covered by contracts for a part of next year.

Concrete Bars Placed

Youngstown, O., Dec. 19.—An order for concrete bars has been closed during the past week by the government. The order calls for 1500 tons, and when completed will be used for a certain job now under construction for the army.

Expect Shafting Buying

Pittsburgh, Dec. 18.—Makers report domestic buying of cold rolled shafting is light. Business taken is chiefly for the government. It is believed, however, automobile makers soon will come into the market and place sizable tonnages. They have been holding off pending the ascertainment of the government's policy with regard to curtailing their output. It now seems that the government is not going to interfere with the automobile industry to the extent first reported. The same situation applies to the screw stock industry whose requirements for cold rolled shafting are expected to involve good-sized tonnages soon. Government orders are being placed at 17 per cent off the list, Pittsburgh. Some of this tonnage is for airplane parts.

Hoops and Bands Quiet

Pittsburgh, Dec. 18.—The market for hoops and bands is quiet. Limited lots of hoops have been sold for early delivery at 3.50c, Pittsburgh. Some makers are not accepting band tonnages at 2.90c, Pittsburgh.

Nuts and Bolts Active

Pittsburgh, Dec. 18.—Activity continues to prevail in the market for nuts, bolts and rivets. Makers have enough tonnage booked to insure heavy operations. Production was cut down by the recent blizzard, some plants having had to suspend. Most of the business being placed is directly or indirectly for the government. Steel supplies have been obtained in a satisfactory manner and 2.90c, Pittsburgh, is being paid covering into government requirements. Bar tonnage for nonwar orders have not been had at this price so far as reported. Domestic demand is expected to become brisker after the expiration of the existing bar contracts in a month or two.

New Schedule

Of Warehouse Prices Put Out at Boston—Chicago Volume Less

Boston, Dec. 17.—A new schedule of warehouse prices for steel and iron products has been established by the local jobbers. While not yet down to the figures suggested by the Iron and Steel institute committee, prices only slightly are above the recommendations of the committee. There is no doubt that quotations now would be down to the point suggested if they had not been tied up with high-priced irrevocable contracts, while in spite of the fixing of mill prices it has not been possible for the local jobbers to average down their costs. One or two jobbers still are quoting rather high, but most of the trade is on the basis now quoted. Business still is reported good and there is a steady depletion in warehouse stocks, since the inward movement is more or less hampered by the railroad situation. Prices in warehouses are as follows: Soft shapes, bars and bands, 6 inches and narrower, 4.11½c base; rounds and squares, 1⅞ inches and smaller, 4.11½c base; rounds and squares, 1 15/16 inches and over, 5c base; hexagons, 5½c base; flats, 1½c inch thick and not over 6 inches wide, 5c base; flats, wider than 6 inches and 1 inch thick, 6c base; flats, wider than 6 inches and less than 1 inch thick, 6c

base; angles, channels and beams, small, under 3 inches, 4.11½c base; angles, channels and beams wider than 3 inches, 4.21½c base; tees, less than 3 inches, 5.26½c base; more than 3 inches, 4.75c base. Boston jobbers have a carting charge of 35 cents net for 200 pounds or less, running down to 90 cents net for lots from 1501 pounds to a ton, while for ton lots and over the charge is 5 cents per 100 pounds.

Chicago Demand Lighter

Chicago, Dec. 18.—Instead of demand for material from store increasing with prices fixed at a lower level, it is a fact that this business is somewhat lighter than last month and considerably less than the corresponding month last year. This appears to be due to decreased demand on the part of fabricators. Building is at a low ebb and fabricators engaged in working up material for the government's shipbuilding program do not obtain any of this from warehouse. The steel is being forwarded by the government from mill and the shops are being paid simply for the fabricating work. This is carried to the point that even the rivet rods from which the rivets are made are bought by the government from the mill and fabricators must either make the rivets or have them made by some manufacturer. Difficulty in securing sufficient long and wide plates continues, but other plates are not so difficult to obtain.

Restrict Sales

In Wire Products to Essential Needs —Russia Quits as Buyer

Demand for wire and wire products is fairly active. Makers are restricting offerings and selling only to regular customers and those engaged in the production of essentials. Caution shown by wire mills in taking orders is due to the shortage of steel. Round tonnages which they ordinarily consume are being diverted to the production of shell requirements and other military needs. The government is an especially active buyer of nails.

Russia Drops From Market

Youngstown, O., Dec. 19.—Considerable small tonnages of wire have been placed by the government in this district lately. Domestic business, however, has been relatively light and practically all export business has vanished. One producer states that Russia, which recently purchased 2000 tons of barbed wire, has left the market.

Sheet Demand Slackening

Government Business Drops Off With Valley Mills But Orders for Quarter Reach 10,000 Tons—Auto Builders Buy

Youngstown, O., Dec. 19.—Manufacturers of sheets in the Mahoning valley state that the demand has reached the lowest ebb since the government adjusted prices, but that the present inactivity is not threatening to market conditions. A period of slackness is usually noted around the holidays, because buyers are more interested in invoicing than in buying. The demand on jobbers for domestic consumption has been extremely heavy of late and manufacturers are welcoming the present indisposition of buyers to place further orders. Stocks have long disappeared and prospects of their replenishment are slim. All valley mills are on government work; some, where permitted, are on export work. A fair estimate of governmental and allied tonnage for miscellaneous sheets allotted to the mills in this territory for this quarter can safely be placed around 10,000 tons. One producer who has given government orders preference over others, still is shipping high-priced sheets which were contracted for by domestic buyers before the price announcement. An inquiry for 1000 tons of blue annealed, No. 10 gage, was issued recently by a western construction firm, but received little attention. No further inquiries for fairly large tonnages have been noted.

Auto Builders Place Orders

Pittsburgh, Dec. 18.—Fair demand exists for sheets and indications are that there is an awakening of activity in the automobile industry. Makers of cars are releasing orders rather freely and it is believed that requirements from this source will increase soon. Sheet manufacturers probably have sold all the tonnage they had allotted for the first half of 1918 covering blue annealed and black sheets. Galvanized sheets so far have been sold only for first quarter. Makers of electrical equipment and other products are active buyers. Large tonnages have been taken either directly or indirectly for the government, whose requirements have been given preference. There has been a hesitancy on the part of some consumers, among them automobile makers, about coming into the market, due to the fact that they have been uncertain as to the extent they could operate their plants. The sharp curtailment which, it was reported, the government would bring about in the automobile industry, has not developed and apparently there is no immediate prospect of this being brought about.

Seek Tonnage for Export

Chicago, Dec. 18.—Heavy demand for all grades of sheets for export is being received by makers in this district. The leading independent sheetmaker in this territory, who has been out of the market for a short time, finds he is able to take on some further tonnage of blue annealed sheets for first quarter delivery. This was made possible by withdrawal of a government tonnage for use by eastern manufacturers. This interest has not sold sheets yet for second quarter delivery. Demand seems to be greater for light gage sheets and while domestic users are seeking considerable tonnage, export demand, especially for galvanized, is extremely heavy. On export business a premium of $10 to $15 per ton is being obtained.

First Half Needs

In Tin Plate Now Fully Covered—Heaviest in History

Pittsburgh, Dec. 18.—It is probable that tin plate requirements for the first half of 1918 have been covered fully. They are heavier than ever before in the history of the industry, due to the demands in connection with the food conservation program. Makers will be able to take care of all requirements, provided operations are not interfered with through the shortage of steel and if the necessary shipments can be made. The theoretical capacity of the tin plate industry in the United States is approximately 38,000,000 base boxes of coated tin mill products. The figure of 48,000,000 base boxes given last week, was an error.

Allies Want New Lot

Youngstown, O., Dec. 19.—Producers of tin plate in this territory have opened their books for first half delivery. Export tonnages are absorbing a large proportion of the business and recently made contracts averaging from 2000 to 4000 base boxes. That the allies are in need of further tonnage is shown by a current inquiry for 10,000 base boxes for March delivery.

Structural Awards Expand

November Lettings Due to Government Contracts Increased to 77 Per Cent of Shop Capacity—Little Commercial Work

New York, Dec. 18.—Placing of large tonnages of fabricated steel for merchant vessels has resulted in more activity in structural shops than at any time since last December. As shown in the monthly report of the Bridge Builders and Structural society, 77 per cent of the total shop capacity, or 138,600 tons, was contracted for in November. As additional large contracts for ship steel are on the eve of being placed, further increases in shop bookings are expected this month. A comparative statement follows:

Month	Per cent	Approx. tonnage
November, 1917	77	138,600
October	61½	110,700
September	29	52,200
August	38	68,400
July	41½	74,400
June	47½	85,500
May	56½	102,000
April	61	110,000
March	68	122,000
February	59	106,000
January	61½	119,000
December, 1916	86	148,000
November	78	134,000
October	77	133,500
September	52½	99,400
August	64	112,600
July	47½	83,600
June	58	100,000
May	80	137,000

Export business in structural shapes has been brought practically to a standstill by the embargo against export shipments recently declared by the railroads. It now is necessary not only to get a government permit, but a railroad permit in order to ship abroad. Prices on plain standard sections for export recently have ranged from 3.75c to 4c, Pittsburgh. The Submarine Boat Corp. has made arrangements for the placing of the fabricated steel required for the one hundred 7500-ton vessels called for in its second contract with the Emergency Fleet corporation. So far, none of this tonnage actually has been distributed.

Ordnance Plant Placed

Cleveland, Dec. 18.—Fabricating business is inactive except for one or two large inquiries. Several small jobs are coming up from time to time, but these generally are of an urgent character and require steel from stock. The Bethlehem Steel Bridge Co. has been awarded the contract for supplying the steel for the new plant of the Morgan Engineering Co., Alliance, O. The tonnage involved is about 4000. The Brier Hill Steel Co. wants 1900 tons for new construction, and the city of Columbus 1500 tons for a highway bridge.

Government Needs Predominate

Pittsburgh, Dec. 18.—Nearly all of the business coming from fabricators is for the government. Orders are being placed either directly or indirectly to take care of its requirements. Domestic orders are almost negligible. Some fabricators report that it is not possible to obtain steel for civil use at the government price of 3c, Pittsburgh.

Western Lettings Few

Chicago, Dec. 18.—Lettings of structural material in the west are light and are confined to railroad and industrial buyers. One project involving 250 tons for a government warehouse at San Francisco has been changed to reinforced concrete, probably to conserve steel for other purposes. Plain material is in less demand, as building projects are not being carried on in the usual volume.

CONTRACTS PLACED

Addition to present buildings, Twentieth street dock warehouses, for the United States government, at San Francisco, Cal., 250 tons, to reinforced concrete.

Five girder bridges for the Missouri, Kansas & Texas railway of Texas, at Dallas, Tex., 226 tons, to American Bridge Co.

Structural steelwork for complete coal tipple for the Dering Mines Co., Eldorado, Ill., 165 tons, to the Illinois Steel Bridge Co., Jacksonville, Ill.

Ordnance plant for the Morgan Engineering Co., Alliance, O., about 4000 tons, to the Bethlehem Steel Bridge Co.

Bridges and crane runways for Pennsylvania railroad, 300 tons to American Bridge Company.

Building in Edgewater, N. J., 300 tons, to Levering & Garrigues.

Bridge for southern railroad, 300 tons, to American Bridge Co.

Pier at New Orleans, 750 tons, to Virginia Bridge & Iron Co.

Crane runway at Washington navy yard, 950 tons to McClintic-Marshall Co.

Brass foundry and general foundry buildings at Washington navy yard, 1200 tons to American Bridge Co.

CONTRACTS PENDING

Construction work for the Brier Hill Steel Co., Youngstown, 1900 tons, bids being taken.

Highway bridge for the city of Columbus, O., 1500 tons, bids being taken.

Municipal light plant, Cleveland, 900 tons. Republic Structural Iron Works low bidder.

Lewis A. Larsen, formerly assistant comptroller of the American Locomotive Co., New York, resigned and has been appointed assistant to the president of the Lima Locomotive Works, Co., Inc., with headquarters at Lima, O. Prior to his affiliation with the American Locomotive Co., in 1907, he was associated with W. H. S. Wright, railway Supplies, representing the Railway Steel Spring Co., the Pittsburgh Forge & Iron Co. and other companies.

Further Tonnages

Of Plates For Government Ships Distributed to Producers

Cleveland, Dec. 18.—Further orders against the approximately 54,000 tons required for the 40 government ships recently awarded to the American Shipbuilding Co., are being made. As yet, however, only a portion of this business has been placed. Both independent and Steel Corporation mills received allotments of several thousand tons each. Some of the requirements are to be filled by specifications against old contracts which these shipbuilders previously had entered into with the mills. No new government business has been disclosed in plates in this district this week, but there is considerable in sight. The award of the 420 water-tube boilers for the Emergency Fleet corporation boats still is withheld. A local mill still is quoting sheared plates of limited widths at 4c, mill, and sheets at 4.25c, mill. Offerings of bessemer plates at 3.25c, Pittsburgh, are heavier and some makers have been able to ship in three to four weeks.

Receives Government Tonnage

Youngstown, O., Dec. 19.—Additional tonnage of plates has been accepted by a valley maker for the Emergency Fleet corporation. The plates will be 86 inches wide, and will be shipped to the American Shipbuilding Co. in a nearby district. The order aggregates 5800 tons. Shortage of coal in this district has hindered the production of plates recently. However, the mills have been able to roll a limited quantity from open-hearth steel by diverting part of the coal supply from coke ovens to the gas producers.

Open Market Offerings Few

Pittsburgh, Dec. 18.—Government requirements continue to be placed for plates and offerings in the open market appear to be entirely lacking. A seller in the Pittsburgh district managed to find 500 tons of extra wide plate slabs, which were sold at $60, Pittsburgh. Domestic consumers appreciating that plate mill capacity

is sold up, are withdrawing from the market after having found it was impossible to obtain their requirements. No orders for cars have been placed in this district during the past week. Buyers of cars are fairly well supplied with plate tonnages, but deliveries being made to their plants represent only about one-half of their demands.

Receives More Ship Lots

Chicago, Dec. 18.—The leading independent steelmaker in the Chicago district has been awarded 6000 tons of plates and other steel for five ships, three to be built at Chicago and two at Superior by the American Shipbuilding Co. These are part of the government's shipbuilding program. Other steelmakers have been awarded considerable tonnage of plates and shapes to be fabricated by bridge and structural shops and used in the Emergency Fleet corporation's activities.

Demand Improves

In Cast Iron Pipe from Both Domestic and Foreign Sources

New York, Dec. 18.—Inquiries for at least 15,000 and probably 20,000 tons cast iron pipe for export are crystalizing and it is believed that the major portion of this tonnage will be closed in the next two or three weeks. Included in this pending business are several lots totaling about 3000 tons for France, some 6000 tons for Porto Rico, and tonnages for several South American countries. The question of vessel space is the uppermost factor in the closing of this business. Demand for cast iron pipe generally has shown a great improvement. The government has distributed orders for some 2900 tons of cast iron pipe for military use in France. Numerous municipal tonnages now are being estimated and it is expected that these will be advertised shortly. Baltimore, on Dec. 19, is opening bids on 700 to 800 tons.

Pipe Tonnages Not Placed

Pittsburgh, Dec. 18.—Placing of contracts for its heavy annual pipe requirements has been deferred by the Philadelphia Co., but it is expected to close this week. Its inquiry involves 375 miles of lap weld pipe totaling approximately 20,000 tons of 2 to 16-inch sizes. Its iron pipe inquiry calls for about 9000 tons ranging from 1½ to 10¼ inches. While some makers have been unable to consider this inquiry, it is believed the buyer will succeed in placing the order.

Shell Steel Orders Heavy

Recent Allotments for Army Total Approximately 1,250,000 Tons—Further Large Assorted Inquiry Expected to Appear Shortly

New York, Dec. 19.—Further requirements for shell steel have come out from the government. One maker in an Ohio district has taken an approximately 3000-ton allotment which calls for shell body steel rolled from open-hearth stock. The finished product will be delivered to a Cleveland plant where it will be machined into an 8-inch shell for the navy department. About 75 per cent or approximately 1,250,000 tons of the 1,500,000-ton shell steel order for the army has been distributed. This allotment was referred to by THE IRON TRADE REVIEW in the Oct. 25 and Nov. 1 issues. Most of this business was placed in November. It is expected that another very heavy assortment of shell steel needs will be put out by the government within the next week or two.

Billets and Sheet Bars Scarce

Pittsburgh, Dec. 18.—Extreme scarcity of billets and sheet bars has made it impossible for many buyers to cover requirements. Inquiries continue to be numerous, but there are no offerings. Producers have sought to take care of the demands of regular customers as far as possible, but the tonnage available has proven inadequate. There is considerable apprehension that as the result of the lessened output, sheet tonnages particularly will be considerably below requirements next year. Efforts are being made to see that enough steel goes to tin plate mills to take care of the demands made these producers. Operations of open-hearth furnaces have been reduced owing to inability to obtain pig iron and scrap.

Considerable demand exists for wire rods, some of it coming from foreign countries. One large maker is entirely out of the market and has not sold soft rods for some time, but up to recently was selling limited tonnages of carbon rods. The latter sell at from $10 to $20 a ton above No. 5 soft rods on which the government fixed a price of $57, Pittsburgh, but no differential was established on carbon rods.

Buying of Strip Limited

Pittsburgh, Dec. 18.—Demand from domestic consumers for cold rolled strip steel involves only comparatively small tonnages. Consumers have been in an uncertain state as to what the government may do regarding the curtailment of their output. This is particularly true of manufacturers of products that may be classed as non-essentials. Government restrictions on the production of so-called non-essentials are becoming more severe. It is probable that automobile makers, after consuming rather heavy shipments of cold rolled strip steel, will come into the market again soon. Cold rolled strip steel is quoted at 6.50c, Pittsburgh, and hot rolled strip steel at 4.50c, Pittsburgh.

Car Buying

Drops Off to Small Volume—Illinois Central Revives Inquiry

Chicago, Dec. 18.—Practically no inquiry for railroad freight cars is now before the market, although the Illinois Central has revived its former inquiry for 1000 hopper cars, which apparently had been dropped. The Louisville & Nashville railroad has ordered 300 steel underframes from the Western Steel Car & Foundry Co. No activity is apparent in the rail market and comparatively little tonnage of track fastenings is being sold as most railroads have been well supplied in former contracts. Some activity continues for light rails and sales are being made at a rate about equal to production. Some light rail contracts are on the verge of expiration, but these have been fully specified, and the delivery of this tonnage will run over a number of months in 1918. Sellers will not accept new contracts until these specifications have been shipped.

New Rail Business Slight

Pittsburgh, Dec. 18.—New business taken by producers of light rails is extremely limited, while there is some demand for standard rails. Mills are sold up for this latter kind of tonnage and are not yet quoting for 1919 requirements. There has been some activity in the standard spike market. Railroads and supply companies have taken lots at 4.50c to 5c, Pittsburgh. Small spikes are selling rather freely, ½-inch size commanding 5.50c base Pittsburgh, 7/16-inch 6c base Pittsburgh, and 5/16-inch 7c base Pittsburgh. Makers are making good deliveries on this class of business.

Prices Wait Upon Study of Costs

Conference of Trade Commission With Iron and Steel Makers Produces Much Data for President's Examination—Diverse Opinions Now Prevail Whether Fixed Schedules Will Be Revised or Reaffirmed Jan. 1

WASHINGTON, Dec. 18.—The federal trade commission's latest report to the President on its investigation of steel production costs including information obtained from October cost sheets probably now is at the White House and may later this week be submitted to the war industries board as a guide to whatever step will be taken in the revision or affirmation of present agreed base prices which are subject to adjustment Jan. 1.

Following the conference of steel, pig iron and coke producers with members of the war industries board and the trade commission on Monday of last week the feeling prevailed here that the present prices possibly would not be revised until the end of the first or second quarters of the new year. But producers should not feel too secure under this impression. Some drastic steps may be taken; in fact it is rumored now that coke, pig iron and several steel products may be marked down, but this has not been confirmed.

Works Accountants Quizzed

What the trade commission's report to the President says is a matter of speculation. Last Friday accountants and officers of steel, coke and pig iron companies met with the commission and discussed costs and the reasons for whatever changes were noted in the figures presented by the commission. At this conference Commissioners Davies, Murdock and Colver, with their investigators, sat with J. Leonard Replogle, director of steel supply, of the war industries board, and Warren S. Blauvelt, coke director of the fuel administration. High and low costs, averages, etc., were submitted, but no names were mentioned. The matter of standardizing cost sheets was not discussed. Some 50 odd representatives of producers attended and later were questioned individually regarding their own particular figures.

Iron Costs Vary Widely

The steel companies reporting on a pig iron production of 2,000,000 tons in October are understood on good authority to have shown costs varying from $16.50 to near $37 per gross ton, with 90 per cent of the total under $27. Costs of 85 per cent of the October production were said to be $20, compared with $16 for the same percentage in June. Northern merchant furnaces reported on an output of 800,000 tons of all grades. The cost of basic was shown to be lowest at somewhat above $15 and highest near $38. The cost of 90 per cent of the production was $28.50 per gross ton. Southern furnaces, making 137,000 tons in October, showed the lowest cost was $13 per ton and the highest $31, compared with a June low of $12 and a high of $27. Eighty-five per cent of the October production cost 15 cents per ton more than 80 per cent of the June output.

Rollings Show Wide Spread

Fully integrated plants rolled blooms, billets and slabs in October with a low cost of $30 and a high of $42 per gross ton. The July low was $22 and the May high $33. Ninety per cent of the October costs were near $37. These plants also produced sheared and universal plates in October at $36 per net ton as the low cost and $67 as the high. The lowest cost in June was $34.50. Eighty per cent was under $49. The sheared plate output in October was 40 per cent heavier than in June, but these mills produced only 60 per cent of sheared and universal plates in October, compared with 75 per cent in May. Plants which buy pig iron produced 13 per cent of the sheared and universal plate output at a low cost of $61 per net ton and a high of $93. Shape costs in October ranged from $39 low to $52.50 high, compared in June with a little above $37 as the low and approximately $38 as the high figure. Three-fourts of the mills rolled under $45. Eighty-five per cent of the rails produced cost under $37 per gross ton.

The labor in pig iron produced by steel companies cost 64 cents per gross ton in October, compared with 53 cents in June. The labor charge in the north, where the total cost was near $38 per ton, was $1.09 per ton. One company whose pig iron cost was $16.50, compared with $27 in October, reported its labor had increased from $1.45 to $2.55 per ton. One southern maker's costs increased $1 in October over those of June, which were $13.25, with labor remaining unchanged at near $1.60. Beehive coke producers reported that of over 2,000,000 tons produced, 65 per cent cost under $2 per net ton. Eighty-five per cent of the cost in the Connellsville region in October showed a low of about $2.15 and a high above $5, compared with a June low of $2.14 and a high of $5.64. In all beehive districts 80 per cent of the costs were under $4.40 per ton, and 85 per cent under $5.10. The by-product makers reported on an output of 1,400,000 tons. Costs ran from $2.20 to $9.50. Eighty per cent were under $5.70.

While an unfavorable impression now is being felt as to what may be done with prices at the beginning of the new year, the earlier belief that the base figures will be untouched also remains vigorous in many quarters. The optimists point out the war industries board will realize present prices have not been given a fair trial; that the full list of extras has not yet been published and that until they are fully in effect a change in base prices would be unwise. They also point out costs in many instances have been increased. However, those more cautiously inclined feel the trade should go slow in banking on any rumors or reports that may be afloat.

Will Pomerene Bill Affect Prices?

What effect the possibilities of the Pomerene bill may or may not have in the contemplated action on prices also is a matter of conjecture. Senator Pomerene and Senator Newlands, chairman of the interstate commerce committee, which has the bill in charge, both said last week they expect to take the measure up soon. "Soon" now means after Jan. 3, the date on which congress reconvenes following the holiday recess which begins tomorrow.

The report that another conference between steel manufacturers and the war industries board is to be held this week is groundless. Chairman Willard of the board states that no such meeting is contemplated for the present.

An agreement entered into between Harvard University and the Massachusetts Institute of Technology, under which the latter was to expend three-fifths of the income of the Gor-

don McKay endowment to Harvard, to conduct courses in mechanical, electrical, civil and sanitary engineering, mining, metallurgy and in the promotion of research in those branches of applied science, has been declared void by the supreme judicial court of Massachusetts. The court holds that the income of the endowment must be administered according to the intention of the founder. The endowment fund is expected to reach $30,000,000 on the death of the last annuitant.

Will Not Regulate Lead; Copper Still Uncertain

Washington, Dec. 18.—Decision of the war industries board, after a conference with lead producers yesterday, not to regulate the industry either by the establishment of base prices or otherwise was after a "prolonged conference and thorough consideration of the facts". The copper conference last Friday and Saturday, however, seems to have been of the same character of the steel conference a week ago. The question of prices is said not to have been discussed.

The lead men who attended yesterday's conference were: J. H. Lange, treasurer, L. Vogelstein & Co.; Edward Cornish, president, National Lead Co.; John E. Williams, secretary and treasurer, Pennsylvania Smelting Co.; Clinton H. Crane and I. H. Cornell, St. Joseph Lead Co.; Edward Brush, vice president, American Smelting & Refining Co.; F. Y. Robertson, vice president, United States Smelting Co.; A. G. MacKenzie, George H. Dern and J. F. Callbreath, secretary, American Mining Congress; Ravenel MacBeth, Idaho Mining association; R. A. Young, Washington State Metal association; and Pope Yeatman, consulting engineer.

At the copper conference among those who attended were: N. L. Amster, Shannon Copper Co.; S. Rosenstamm, Miami Copper Co.; Joseph Glendenning, American Smelting & Refining Co.; C. F. Kelley, Anaconda Copper Mining Co.; R. L. Agassiz and James MacNaughton, Calumet & Hecla Mining Co.; P. Todd, Quincy Copper Mining Co.; James A. Nelson, Ohio Copper Co.; and T. Wolfson, United Metals Smelting Co.

The Hamburg Foundry Co., Hamburg, Pa., which recently was organized to manufacture large engine castings, has completed its plant, and the latter is about to be operated.

Suspended Plants Resume

Relief from Coal Shortage is Being Obtained in Most Affected Districts—Many Furnaces Still Banked

Manufacturing plants in Ohio which have been shut down recently because of the coal shortage due to storm conditions gradually are resuming operation. In some districts enough coal has been received to operate for a few days only; in others, the situation is less acute.

Plants located in the Cleveland district have been fortunate in obtaining coal from lake boats. The American Steel & Wire Co. last Saturday unloaded 6000 tons from a boat and distributed the tonnage to its plants over the city. As a result operation of all finishing mills has been resumed. At Central plant furnaces "A" and "D" are on normal blast. The "Emma" and "C" stacks are still banked. The coke shortage has hindered the pig iron output at this plant for some time. Only 86 cars of coke were delivered over a period of four days recently, while the daily requirements are about 75 cars.

Operating conditions in the Mahoning valley still are acute. All departments of the Republic Iron & Steel Co., with the exception of the open hearth and 80 per cent of the coke ovens, are idle. The Youngstown Sheet & Tube Co. have one furnace banked and one battery of coke ovens on gas at their East Youngstown plant. Two stacks of the Carnegie Steel Co. at the Ohio works and the Niles furnace are also banked. The latter stack has been idle since October. Producers state the railroad yards at East Youngstown are flooded with cars of coal and that congestion and lack of motive power are the chief causes for the existing shortage.

Coke Shortage Cuts Steel Output at Chicago

Chicago, Dec. 18.—Shortage of coke supply is interfering materially with blast furnace operation of the Wisconsin Steel Co. at South Chicago. This company blew out one stack Dec. 6 and has just banked another stack. This leaves one stack in operation. The Wisconsin Steel Co. owns its own beehive ovens in the south, but does not produce sufficient coke for all three stacks, and depends for some supply on the Connellsville region. Recently it has been receiving some coke from an independent steelmaker in Chicago and also has bought by-product coke from other sources. As a result of this condition, its output of steel is much curtailed and it is able to operate only one of its bar mills. Aside from this curtailment, and the four stacks of the United States Steel Corp., which have been cold for several weeks, there has been no actual shutting down of blast furnaces in the Chicago district. All merchant furnaces are active except one at the plant of the Iroquois Iron Co. at South Chicago, which is out for repairs.

May Close Plants

Washington, Dec. 17.—Federal Fuel Administrator Garfield has authorized William K. Prudden, administrator for the state of Michigan, to close all or a number of the industrial plants, along with theaters and other amusement places, during the holidays, if necessary to meet the coal requirements of the domestic consumer. The request for this authorization came from Mr. Prudden.

Obituaries

Robert Douglas Meacham, formerly traffic manager of Rogers, Brown & Co., Cincinnati, died suddenly while on a business trip to Louisville. He was stricken with an attack of appendicitis and death ensued before an operation could be performed. Mr. Meacham volunteered for service in the American Ambulance corps in France before America's declaration of war and only recently returned to this country to recuperate. He was a son of D. B. Meacham, well known ironmaster and Cincinnati partner in Rogers, Brown & Co.

Michael F. Kerby, president, T. P. Kelly & Co., Inc., New York, manufacturers of foundry facings, equipment and supplies, died Wednesday, Dec. 5. Mr. Kerby entered the employ of T. P. Kelly & Co., Inc., in 1885 and between the years 1888 and 1890 had charge of their Chicago offices. For a number of years he was traveling representative in the states of Ohio, Pennsylvania and New York. During the absences of T. P. Kelly on trips abroad Mr. Kerby was manager of the business and in 1911 was made president of the company. He was a member of the American Foundrymen's association and served as president and director of two other corporations.

License System

On Imports of Ferroalloys to be Handled by Institute

New York, Dec. 18.—A meeting of those interested in the import of manganese and ferromanganese, spiegeleisen, tungsten, chrome, molybdenum, cobalt, titanium and vanadium ores, was held here yesterday at the request of Frederick B. Peterson, director of the bureau of imports of the war trade board, who attended the meeting. It unanimously was resolved to designate the American Iron and Steel institute to act under the direction of the war trade board in connection with import licenses for these articles. While the definite application of the license system has not yet been worked out, it is expected that it will be along the same lines as the system now prevailing with reference to tin imports.

On ferroalloys, the market during the past week has been fairly quiet. The principal sales were of spiegeleisen, and a number of round tonnages were sold around $60, delivered. Small lots for prompt shipment went at as high as $62. The market appears firm, although on some inquiries $60 has been quoted without taking business.

Ferromanganese is firm at $250, delivered, minimum. Sales of small quantities for prompt shipment were made during the past week at $250 to $255, delivered. New inquiry is apparently small.

Sales of a few small tonnages of 50 per cent ferrosilicon for prompt shipment were made during the week at around $175, and this figure now appears to be the minimum on spot. Sales of first half over the past couple of months total large and in fact most of the first half output now has been sold. Most sellers now are accepting additional first half business only when it is coupled with tonnage for the entire year.

Sixty to 70 per cent ferrochrome, containing 4 to 6 per cent carbon, continues scarce for prompt shipment, while demand is fairly urgent. Spot ferrochrome may be quoted at 35 to 45 cents per pound at the furnace, depending upon the customer and the size of the business. No contract ferrochrome now is offered.

Ferrosilicon Needs Covered

Pittsburgh, Dec. 18.—Consumers of 50 per cent ferrosilicon are fairly well covered for their 1918 requirements. Most of this tonnage is understood to have been sold at $155 to $160, Pittsburgh, according to the quantities involved. Sales of 50 per cent ferrosilicon for first quarter delivery have been made, however, at $170, Pittsburgh. The market for 80 per cent ferromanganese is quiet. Consumers have been buying only according to immediate needs, while makers have not been anxious to sell. It is known that there were offerings made about one month ago which steel works producers now are using for their own needs. While there was a fair accumulation of domestic manganese ore some time ago, these stocks are being depleted and this coupled with the fact that transport service between Brazil and the United States has been commandeered by the government has resulted in those holding supplies to be more cautious about selling. The market now seems to be firm at $250 to $255 for prompt delivery and $250 for first half delivery. Twenty per cent spiegeleisen for prompt delivery is quoted at $60 to $61.50, furnace.

Stephen W. Roache, age 60, of the Morgan Iron Works, New York, died Dec. 14, in Harrison, N. Y.

Patriotism is Keynote of Foundrymen's Banquet

With 325 present, the largest attendance in its history, pledges mounting to $2,425.50 were made Monday night at the Christmas banquet of the Pittsburgh Foundrymen's association to aid the permanent blind relief war fund for soldiers and sailors. Patriotism was the key note of the occasion and those present responded liberally to the appeals of Benjamin Page, treasurer of the fund, and W. S. Diggs, Pittsburgh business man. Mr. Diggs asked for foundry firm contributions of $50 each to the fund and there was a goodly number of these made. Toastmaster W. W. Sanderson was just completing the recording of names of these firms when one man raised his contribution to $100 and similar action was taken by others. The event took on the aspect of an auctioneer's stand, original subscriptions being increased by various contributors.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Dec. 18.—Two meetings of interest to the nonferrous metal trades have been held in Washington the past week. One of these was the conference of representatives of leading copper producing companies with the war industries board last Friday. Although it has been announced the meeting would be held for the purpose of discussing revision of copper prices, as it was provided in the original agreement the 23.50c was to rule only to Jan. 31, the meeting only considered price revision incidentally. The discussion, as the case in the steel conference, concerned problems relating to production such as labor, materials, fuel and transportation. The advancing costs of production apparently operate against the probabilities of revision downward at present, while copper men, it is understood, would prefer to have the market remain in its present stable position than to upset things by re-opening the whole price question. Consequently the prospects are that the price for carload lots of copper over the next quarter will continue 23.50c, for less than caroads, 24.67½c.

Another meeting of importance was that held between representatives of the lead industry and the war industries board at Washington on Monday, where the questions of price fixing and government control of copper distribution were considered at length. Following the meeting it was stated that no regulatory action affecting the lead industry would be advocated at this time. It is understood that producers promised co-operation on the present basis, which was satisfactory to the board. The government is said to be paying for its lead purchases the average monthly price to the general public as quoted in the *Engineering and Mining Journal*. The market for lead for prompt shipment from the west is quoted 6.25c to 6.37½c, St. Louis.

The tin situation has shown no improvement the past week. Spot offerings have disappeared almost entirely from the market. A small lot of Straits which arrived on the steamer *Irishman* was offered at 92c. This is the only offering reported. Bids of as high as 91c for spot Straits, 90c for spot Banca and 83c for spot Chinese No. 1 are reported. There is no news yet as to the results of this country's efforts to obtain freer granting of permits from the London rubber and tin export committee, now that control of distribution of tin arriving in this country is vested in the tin subcommittee of the American Iron and Steel institute.

The navy department asked for bids on 2,000,000 pounds of Grade C spelter this week, bids to be opened Dec. 21. This is the first government inquiry for this grade since last August. The general spelter market has a little better tone, but prices remain under what is generally asserted to the cost of production. Prompt shipment prime western is quoted 7.50c, St. Louis. Owing to difficulties of transportation the spot market is a little stronger comparatively, spot supplies in the east being quoted about 8c, New York.

The antimony market is inactive. Good-sized stocks are on hand and demand is light. Holders are quoting 15c, duty paid, for spot, Chinese and Japanese brands.

No change is noted in the aluminum market. No. 1 virgin ingot is quoted 36c to 38c, New York; No. 1 remelted, 35c to 36c; No. 12 alloy, 27c to 28c.

The Action of Flame in Furnaces

By Applying Hydraulic Laws to the Flow of Gases, Important Data Have Been Obtained Regarding the Action of Flame in Metallurgical Furnaces—Experiments Vindicate the Theory

BY A. D. WILLIAMS

A MORE exact title for this paper would be "The Action of Flame in Furnaces as Explained by the Laws of Hydraulics," for it consists of abstracts made from the work of this title by W. E. Groume-Grjimailo, professor of iron manufacturing at the Polytechnic Institute of Petrograd. When Prof. Groume-Grjimailo graduated from the Institute of Mines of Petrograd he entered the Salda works of Monsieur Demidow, one of the largest metallurgical plants in Russia. Here he worked under Pierre Chicharine, who was entrusted with the designing of new furnaces and the whipping into shape of those furnaces which did not work in a satisfactory manner. This man, who had but a meager education and could not write his name, was unable to explain his reasons for the changes he made and when questioned, "Why?" generally replied, "It must be made thus, otherwise you arrive at nothing."

Analogy to Hydraulics

After having been at this plant for about 20 years, Prof. Groume-Grjimailo, who during this time had risen to be director of works, conceived the idea that each furnace might be represented by a reservoir and that the design of a furnace was a problem in hydraulics. The circulation of the flame or hot gases was analogous to the movement of a light liquid within a heavier liquid. By making white metal sectional models of furnaces which could be enclosed with glass and immersed in a tank of water and circulating colored petroleum through them, he approximated the circulation of the flame through a similar furnace immersed in the atmosphere. This, rendering the action visible to the eye, made it easier to comprehend what took place in the furnace though at the same time it is only a first approximation in the solution of the problem. Objections may also be made to comparing a current of flame with a current of incandescent gas. Prof. Groume-Grjimailo admits this is a well-grounded objection. When the fact that the circulation of the hot gases is a problem in hydraulics has been completely established, then the dense fog of mystery which envelops the designing of furnaces will be cleared away, and it will be time to establish the details. The foregoing was written in 1911 and since then Prof. Groume-Grjimailo, many of the students under him, and others, have investigated various furnaces applying to their study the general laws formulated and developing the constants necessary to the use of the various formulas involved. The results of this work are such that it can be said that a furnace properly proportioned and designed according to these principles will work well and the results can be guaranteed with as little risk as there is in guaranteeing the working of a steam turbine.

In speaking of Prof. Groume-Grjimailo's work, Henry Le Chatelier says, "he brings forward a principle relative to the circulation of the hot gases in a furnace, a very simple principle, but one which has not been thought of before. We think of gases as filling completely, by reason of their absolute elasticity, the vessels which enclose them. And by unconscious induction, but inexactly we conclude that gases, in their circulation traversing a series of enclosures, traverse equally all points of the spaces open to them and sweep uniformly by their current all the passages through which they pass. Perhaps we should not formulate this erroneous principle in such a precise manner, but nevertheless we act as if we believed firmly in this. And it follows, in the construction of furnaces, that very grave errors are made, to which M. Groume-Grjimailo calls our attention to numerous examples."

Planes of Separation

A comparison may be readily made with those things with which we are familiar. A river which flows in its bed is supported by the earth, bounded upon its sides by the natural surface of the ground. Its upper surface is separated from the air by a horizontal plane whose position is not fixed but which varies with the quantity of water flowing into the stream. The hot gases in a furnace tend to circulate in exactly this same fashion, with this difference, that the plane of separation from the air is below and the cross section of the bed is formed by the roof and walls of the furnace. Nevertheless we frequently consider that the flame fills the furnace and heats it uniformly, when in reality it circulates in the upper portion only and does not come in contact with the material placed on the hearth. The utilization of the heat is very inefficient. The stream of flame flows along the roof and carries all of its heat to the chimney.

Arches Rarely Effective

The formation, in the furnace of these streams of hot gas presents other inconveniences, it opposes and makes difficult the completion of combustion. Above a furnace grate we have parallel currents of gas containing an excess of oxygen or an excess of combustible, which must be mixed intimately in order that they may burn. This requires a certain time and they must be mixed at a temperature sufficiently high to permit the reaction of combustion.

In boiler furnaces an arch of refractory materials is frequently built over the furnace, but if it does not form an inverted bell or reservoir in which the hot gases can accumulate and remain for a time, the passage of the unburned gas is too rapid and the effect of the arch is entirely imaginary. The work of Prof. Groume-Grjimailo is replete with examples containing precise information concerning the works where the observations were made. It is therefore not a purely theoretical work, but is placed before us as a practical treatise concerning things seen.

The fundamental principle of Prof. Groume-Grjimailo's work is that we are surrounded by a liquid ocean, the air. Furnaces we must consider as submerged in this ocean of air. As the density of this liquid is 770 times less than that of water we do not notice its presence and we habitually fail to take account of it, at the same time we must admit with the author that we are not in a vacuum.

Our error lies in neglecting the part which the ocean of air plays and it is due to this that we have difficulty in comprehending the circulation of the flame in a furnace. But when we commence to take account of the presence

A paper presented at a recent meeting of the Cleveland Engineering Society, Cleveland.

of the air then the question of flame circulation becomes very clear.

What is a flame? It is a mixture of gases at a sufficiently high temperature to permit their entering into the reaction called combustion and thus releasing sufficient heat to raise the products of combustion to incandescence.

Exposition of Theory

We may consider a reverberatory furnace as an apparatus immersed in a liquid, the air while in the interior of the furnace a current of incandescent gas circulates, that is to say, a lighter liquid.

An idea in regard to the difference in the density of air at the temperature of an open-hearth furnace, 1638 degrees Cent. and air at 0 degrees, may be obtained by comparing the high temperature air to water and the low temperature air to molten iron. The weight of water being 1000 kilograms per cubic meter while the weight of molten iron is 6900 kilograms per cubic meter.

A furnace in operation may be considered as immersed in an aquarium containing a heavy liquid while its interior is traversed by a lighter liquid and all of the movement of the flame may be compared to that of the light liquid as it floats in the heavier liquid.

Observation Through Model

The circulation of the flame in the furnace may be shown experimentally in the following manner: A white-metal sectional model showing a cross-section of the furnace is made. The open sides of this model are closed with pieces of glass. Tube connections are arranged to the various ports and the chimney opening. This model is then immersed in a glass tank filled with water and colored petroleum circulated through it.

The model used at the Petrograd Polytechnic institute is a reproduction of a brick kiln at the Motovillikha works. The various tubes are supplied with regulating valves. The highest bottle is filled with colored petroleum and is elevated to give it an initial head. The tank or aquarium, containing the model, is filled with water. A drain is provided by which the petroleum as it rises to the top of the water flows into the lower bottle from which it is returned to the upper bottle by means of a small pump driven by an electric motor so that continuous circulation may be maintained.

By opening the central cooling vent in the roof of the kiln, the model may be utilized to show the action that occurs in the old style of direct or top-draft brick kiln.

Upon starting the circulation of the colored petroleum it rises from the fire boxes in a thin stream ascending the arch of the kiln and escaping at the central vent. The circulation of this colored fluid illustrates the reason that the up-draft kiln gave extremely unsatisfactory results when the ware burned required high temperatures, although it could be utilized in burning low temperature products. Another trouble experienced with this type of kiln was the amount of time consumed in a kiln round. The burning time was long. Upon obstructing the egress of the colored petroleum at the central vent this liquid will accumulate under the roof of the furnace until its depth below the vent supplies a head sufficient to maintain an equilibrium between the amount of liquid flowing into the kiln and the amount passing out at the vent.

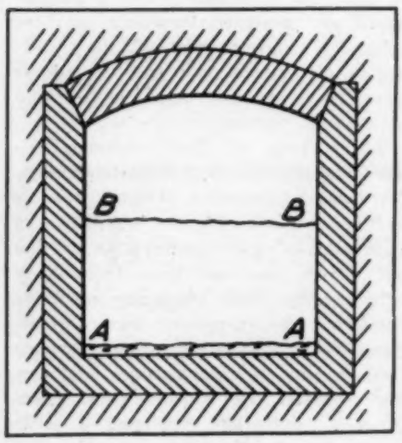


FIG. 1—INVERTED RIVERS OF GASES

The line of demarcation between the colored petroleum is about midway between the crown of the arch and the sole of the kiln. The lower section of the kiln will only be heated by the eddies and the diffusion which take place between the hot gas in the upper section of the kiln and the relatively cooler gases below. A question that may be brought up here is why the lower section of the kiln is not heated by radiation Radiation may take place between a hot gas and a cool solid across a gas space at a lower temperature or from a hot solid to a cooler solid across a low temperature gas space. When the kiln is in operation it is filled with a built-up checker work formed by the ware being burnt. The temperature of each layer of this checker must be raised successively before it can radiate heat to the layer below. This radiated heat will tend to raise the temperature of the cooler gases which will rise carrying the heat back to the high temperature zone.

By further obstruction of the open vent, the line of separation between the hot gases and the cooler gases may be forced down to the sole of the kiln. This manner of working enables certain wares to be burnt in this type of kiln, but it does not work in the most satisfactory manner and cannot be utilized for high grade ware. The flame has a tendency to rise to the opening in the arch and the temperature is not equalized by the eddy currents that form. These currents are very feeble as they depend upon the temperature difference that exists between the gases at the sole level and those under the roof of the furnace. Kilns of this type were formerly in universal use but they have been gradually replaced by the down-draft kiln, although there are many direct draft kilns still in operation.

Combustion Incomplete

When the vent in the top of the kiln is blocked up, the colored petroleum soon fills the kiln and passes out through the lower flue and up the chimney. With this method of operation the hottest gases rise to the roof and a high temperature line starting at the roof gradually descends to the sole of the kiln giving a practically uniform burn. In this type of kiln there will be a very small temperature difference in the height of the kiln and the reaction of combustion may be completed with very little free oxygen. There are no definite high temperature centers.

When down-draft kilns are used to burn ware that requires extremely high temperatures, say 1550 to 1600 degrees, which are practically the highest temperatures obtainable with direct firing the air supply must be cut down so close to the theoretical limit that complete combustion cannot be obtained. Under such circumstances the waste gases leaving the kiln are a lean producer gas and are so hot that secondary combustion will occur wherever these hot gases come in contact with the air. This is the explanation of the plume of flame that is usually seen on kiln chimneys.

The basis upon which we compare the current of flame in a furnace to an inverted river may be made more clear by reverting to a couple of illustrations drawn from elementary physics.

The Inverted River

Carbon dioxide gas is heavier than air. It is possible to pour it from one beaker to another. Hydrogen on the other hand is lighter than air, and may be transferred from one vessel to an-

other. The experiment with the hydrogen shows that it is only necessary to confine the current of gas at the top and two sides. The lower or fourth side will be formed by the flowing gases and its position will be determined by the quantity of the gas flowing The conditions shown are practically those existing in most furnaces.

This theory would be erroneous if the flue carrying the waste gases away from a battery of boilers were found to be completely filled with the flowing gases regardless of the number of boilers in service. However, in a flue correctly proportioned, with four boilers in service the lower surface of the current of gases will be found in the neighborhood of the line *AA*, as shown in Fig. 1, while when only one of the boilers is in use the lower surface of the gas current will be in the neighborhood of *BB* In this last case only one-fourth the quantity of waste gases is flowing and the thickness or depth of the gas current is 0.4 of that when all of the boilers are in service or in the ratio of $1 \div \sqrt[3]{4^2}$. In the space *AABB* there is scarcely any circulation of gases.

It is evident that as in a river, the depth of the stream is a function of the quantity of water flowing, so in a current of hot gases the thickness of the stream will depend upon the volume passing through the flue or passage.

The average weight of the gaseous products of combustion is very nearly the weight of air. Therefore all of the computations may be greatly simplified, without introducing any serious error, if the waste gases are assumed to weigh the same as air. The coefficient of expansion of gases by heat is 1/273 and the weight of air at any temperature may be found by the formula:

$$p = \frac{1.29}{1 + a\,t}$$

in which p is the weight of air at t° per cubic meter; a is 1/273; t is temperature of the air.

The hydrostatic pressure in kilograms per square meter at a point in an enclosure filled with incandescent gas, situated at a distance *H* above its lower surface, is equal to the difference, *W*, between the weight of a cubic meter of air and the weight of a cubic meter of the incandescent gas multiplied by the height, *H*.

w = H W, where
w is the hydrostatic pressure in kilograms per square meter.
w = 1.29—p

A number of examples may be cited to show that this hydrostatic pressure exists: The hot air register used to admit hot air from a furnace to a room; the upper peep holes to the regenerators which are on air or gas; the upper portion of many heating furnace doors. This jet of air or gas occurs not because of its temperature, but because it is lighter than the outside air. A similar phenomenon is that which causes the gas pressure in city mains to be higher upon the high ground and the top floors of buildings than it will be on the low ground or in the basement.

It has been believed for a long time that furnaces into which the air was not forced drew in their air supply under the influence of the draft of their chimneys. This is due to a poor interpretation of what takes place.

A first principle which we must remember is that those furnaces which are not provided with working doors or charging openings, may operate, in some manner by the draft of their chimney. Such furnaces are boilers enclosed on all sides in their brick setting, crucible furnaces closed very nearly hermetically, iron tube blast-furnace stoves, etc.

All furnaces which are provided with working doors to their hearth, such as reverberatory furnaces, melting furnaces, puddling furnaces, brick kilns, open-hearth furnaces, etc., do not operate by chimney draft. For these furnaces the chimney merely serves to draw the products of combustion from the hearth, and it is unnecessary to construct the colossal chimneys which are frequently built.

This last may be readily established with a properly designed reverberatory furnace when it is in operation. As the doors are not hermetically sealed

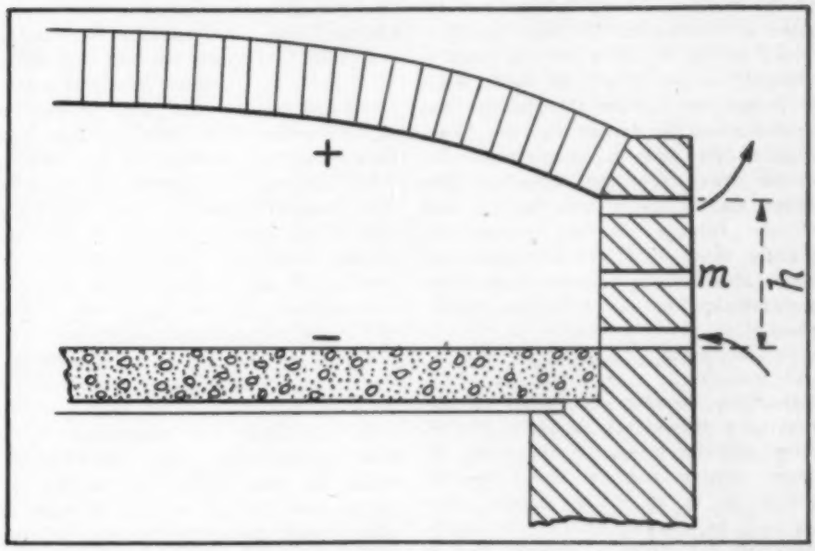


FIG. 3—UNSTABLE PRESSURE CONDITIONS IN REVERBERATORY FURNACE

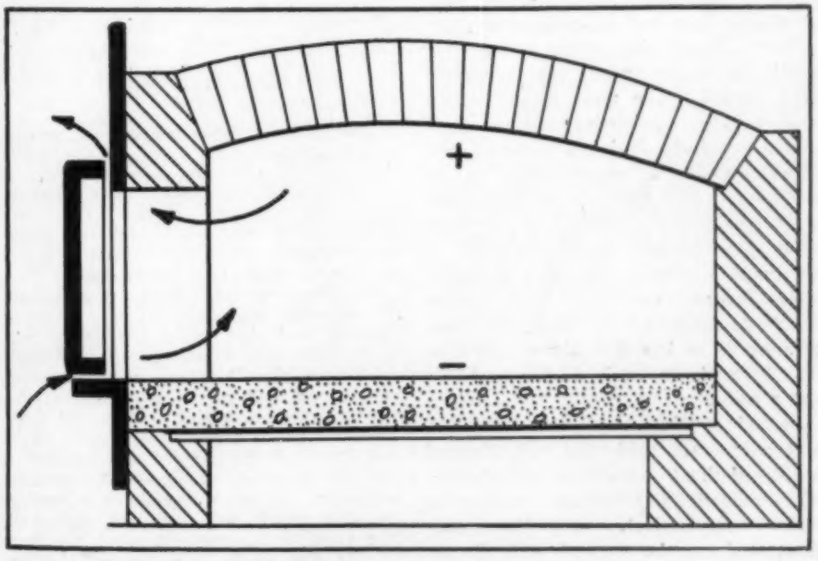


FIG. 2—GAS PRESSURES IN A REVERBERATORY FURNACE

to the walls a jet of flaming gas escapes at the top of the door, as illustrated in Fig. 2. If a flaming torch is brought to this point the flame tends to incline away from the furnace, but if this torch be brought to the lower edge of the door the flame will tend to be drawn into the furnace. This shows that in the vicinity of the roof of the furnace the gas pressure is slightly above that of the atmosphere while at the sole of the furnace the gas pressure is less than the atmosphere.

Furnace Pressures

If three openings are made in the wall of a furnace as shown in Fig. 3, there will be a jet of flame at the upper opening and the lower opening will draw in air. The middle opening will be neutral, but as the conditions in the furnace change slightly from time to time during a portion of the time this opening will draw air into the furnace and at other times a jet of flame will escape from it. These simple observations show that the metallurgical furnaces work with a pressure that is on the average equal to that of the atmosphere. This may also be shown by manomometer observations. Such a furnace will not work regularly and uniformly if the pressure within it is less than that of the atmosphere as under such conditions there will be an inflow of air through the working door which will counterbalance the draft of the chimney, this cold air will lower the temperature within the furnace, chill the charge and have a very bad effect generally.

In many cases it is possible to work a badly designed furnace of this type by forcing the firing to such an extent that the pressure in the hearth is maintained and one of the signs of such inefficient design is the flame jetting out at the lower part of the doors.

With this type of furnace the chimney simply acts to carry off the waste gases and dispose of them where they will not be a nuisance. The pressure of the gas in the furnace will be slightly positive, nearly zero. The fire box acts to pump in the elements necessary for combustion.

Hydraulic Formulas

Following these demonstrations that the gases flowing through the various passages of a furnace followed the laws of hydraulics, Prof. Groume-Grjimailo interested Prof. Yesmann in the matter and he developed formulas based upon those used for the flow of water which with suitable constants have been found to permit of very accurate predictions in regard to the workings of a furnace. These formulas have been used in analyzing a number of existing furnaces of the reverberatory type A feature of this work was that it developed the fact that many of those parts to which empiricism had attributed great importance could be altered within wide limits without any effect upon the working of the furnace while seemingly unimportant portions of the furnace played a very important role in its operation. That proper designing frequently made a difference of between 25 and 30 per cent in the fuel consumption. It was also found that the formulas developed and the proportional methods used in the designing of furnaces were, comparatively, of little value

In establishing the dimensions for a new furnace the factor which determines the size of the sole is the capacity, that is, the amount of material which must be in the furnace at one time or the tonnage to be heated in a unit time. The height of the roof will be governed by the height to which the material may be piled in some cases and in others by the volume of gas and the time it must remain in the furnace, as well as by the flame temperature. The roof must also be so designed that the flaming gases will not be forced down on cold material. The flame temperature may be calculated fairly closely by the methods developed by Damour, Le Chatelier and Mallard. It is also desirable to know the composition of the gases of combustion or more particularly the amount of excess air in these gases. A good coal burned without excess air has a theoretical flame temperature of 2050 degrees. The flame temperature actually developed may be as high as 1400 to 1450 degrees with 70 per cent excess air and it will drop to 1250 degrees with 100 per cent excess air.

For design purpose furnaces may be placed in five main classes, under each of which there will be sub-classes:

First: Small, direct-fired furnaces in which the gases remain but a fraction of a second. The material is charged cold, and the combustion depends upon cold air and the fuel bed is thin. The furnace under a steam boiler is an example of this type. The combustion is comparatively rapid and effected under unfavorable conditions. It is questionable whether properly designed boiler furnaces are worth while except for large units, as the governing temperature is so low that almost anything may be made to work, where smoke is not a nuisance.

Second: Direct-fired furnaces with arch over grate, thick fuel bed. Natural or forced draft (sometimes introduction of secondary air), rapid combustion under comparatively favorable conditions, and can be worked with 50 per cent excess air. Some stoker-fired boilers with high fire boxes approximate this condition. From 14.3 to 48.5 pounds of coal may be burned per square foot of grate. Furnaces of this type are reverberatory matting and heating furnaces, puddling furnaces, glass furnaces, reheating furnaces.

Third: Furnaces fired by producer gas with 150 to 170 per cent air supply. Most gas-fired reheating furnaces fall in this class.

Fourth: Open-hearth and similar furnaces, gas-fired where the secondary air supply is 125 to 150 per cent of the theoretical.

Fifth: Furnaces fired with the theoretical air supply or with a very slight excess of air in which the gases travel slowly. Some brick kilns, tempering furnaces and reheating furnaces fall in this class. The furnaces may be gas-fired or in some cases form a continuation of the gas producer.

Time of Combustion

Another important factor is the length of time the gases remain in the furnace. This varies within wide limits from a small fraction of a second up to 10 seconds. This time is governed by the temperature at which the gases leave the hearth and the flame temperature, in other words the temperature drop per second This drop is as follows:

Open-hearth furnaces, 200 degrees per second.

Reheating furnaces gradual, 150 to 200 degrees per second.

Reheating furnaces, 100 to 150 degrees per second.

Brick kilns, 80 degrees per second.

The values have not been finally established. Exact knowledge concerning the temperature drop per second for all species of furnaces can only be established by observations upon correctly constructed furnaces. This is the principal difficulty.

Temperature Drop

The fall in temperature per second is a function:

Of the radiation loss. This depends upon the radiating surface, the conductibility of the walls and the flame temperature. In other words, it is peculiar to each type of furnace.

Of the heat absorption capacity of the material heated. That is a furnace charged with hot metal or ingots will work differently from one charged with cold material. The drop in temperature per second will be much higher in the second furnace than it will in the first. The first furnace will have a more rapid gas flux and the second will require a greater quantity of gas. A furnace serving a roll train must have a heating capacity which will keep the mill full. For rapid and continuous work the time of the gas in the furnace will be cut down while where the work is discon-

tinuous the time of the gas in the furnace may be increased.

Knowing the working conditions of the furnace to be designed the procedure is as follows:

1.—The volume of the heating chamber is calculated.

2.—The volume of gas obtained per kilogram of coal burned under the service conditions is computed.

3.—The theoretical combustion temperature of the fuel with an assumed excess of air is computed.

4.—The temperature in degrees Cent. at which the waste gases are to leave the heating chamber is determined. This is approximately as follows: Open-hearth furnaces, 1600 degrees; puddling and melting furnaces, reverberatory, 1250 degrees; soaking pit furnaces, 850 degrees; heating furnaces, 1000 degrees; glass melting furnaces, 1200 degrees.

5.—Knowing the temperature of the flame and the temperature of the waste gases the total temperature drop in the furnace is established. This divided by the drop in temperature per second gives the time the gas should remain in the heating chamber.

6.—The capacity of the heating chamber divided by the time the gases remain in it gives the volume of gas per second Qt. at the average temperature of the furnace. From this the quantity of gas at $0° = Qo$ is established and from this the weight of fuel burned per second and per 24 hours can be arrived at.

7.—Knowing Qt, the principal dimensions of the furnace may be computed. The velocities of the gases in different parts of the furnace are computed and from this the necessary hydrostatic head required to supply this velocity can be arrived at; this determines the height from the bottom of the grate to the sole of the furnace for natural draft or the blower pressure required. We can also compute the height of the chimney and the sizes of various flues.

Expenses Belonging to Costs

BY HENRY L. GANTT

IT DOES not require any knowledge of cost accounting, bookkeeping, or other office art to enable the practical man to say that costs should include only those expenses needed to produce the article in question, and that those who insist on including in their costs expenses which do not contribute to the production of the article are simply trying to recover from the public through a higher selling price the expenses which they incur through inefficiency and waste. This statement is made in a paper read at the 1917 annual meeting of the American Society of Mechanical Engineers by Henry F. Gantt, efficiency engineer, New York. Mr. Gantt also points out that, all cost figures may be divided into three parts: Expense for material; expense for labor; and overhead expense, or "burden."

There is no great difficulty about getting the expense for material and the expense for labor, and most concerns get these elements quite accurately, but there is a great variety of opinion as to what the "burden" charge on any particular work should be. This overhead or "burden" may be divided into two parts: That which is incurred through simple ownership or rental of the plant and keeping it ready for operation; and that which is incurred by operating the plant, exclusive of direct labor and material.

Analyzing further the meaning of the term "burden," we see that the first part is made up of ownership or rental of a number of machines or work benches, properly housed. The second part consists of the expense of operating the various machines, which consists of such items as power, oil, waste, repairs, etc.

Inasmuch as the rental which we should pay for the plant is made up of the rental of the individual machines and work spaces, we must be able to determine the proper rental for each of these in order to form an intelligent idea of the proper rental for the whole plant. In the same way we can determine the amount of supervision, power, oil, and waste needed to run these machines individually.

Any article manufactured on a machine should undoubtedly bear the operating expense rate for the time during which the machine was operated on it.

The expense of maintaining the machine in idleness during the time it was not operated cannot legitimately be charged to the work done while it was operated, and should be put into another account.

We thus see that in every plant there are to be considered two kinds of burden: That which produces goods and which can legitimately be charged to the cost of those goods, and that which produces nothing, and must be put into some other account.

A careful consideration of the expense incurred while the plant is idle leads to very fruitful results: first, through an attempt to find out why the plant is idle, and then through an attempt to eliminate the causes of idleness, which are lack of work, lack of help, lack of material, repairs, etc.

This general view of the cost question leads to a further simplification of the problem which is worthy of careful consideration. First, the expense of owning and maintaining a certain machine in idleness properly equipped for efficient operation should be substantially the same in any part of the country where the machine could be bought at substantially the same price. Second, the amount of power, oil, waste, and repairs, and even supervision, of a certain machine should be substantially the same in any part of the country, if it were engaged upon substantially the same kind of work.

Following these lines of thought, we readily see that a standardization of cost methods and of costs is possible, which was unsuspected a few years ago.

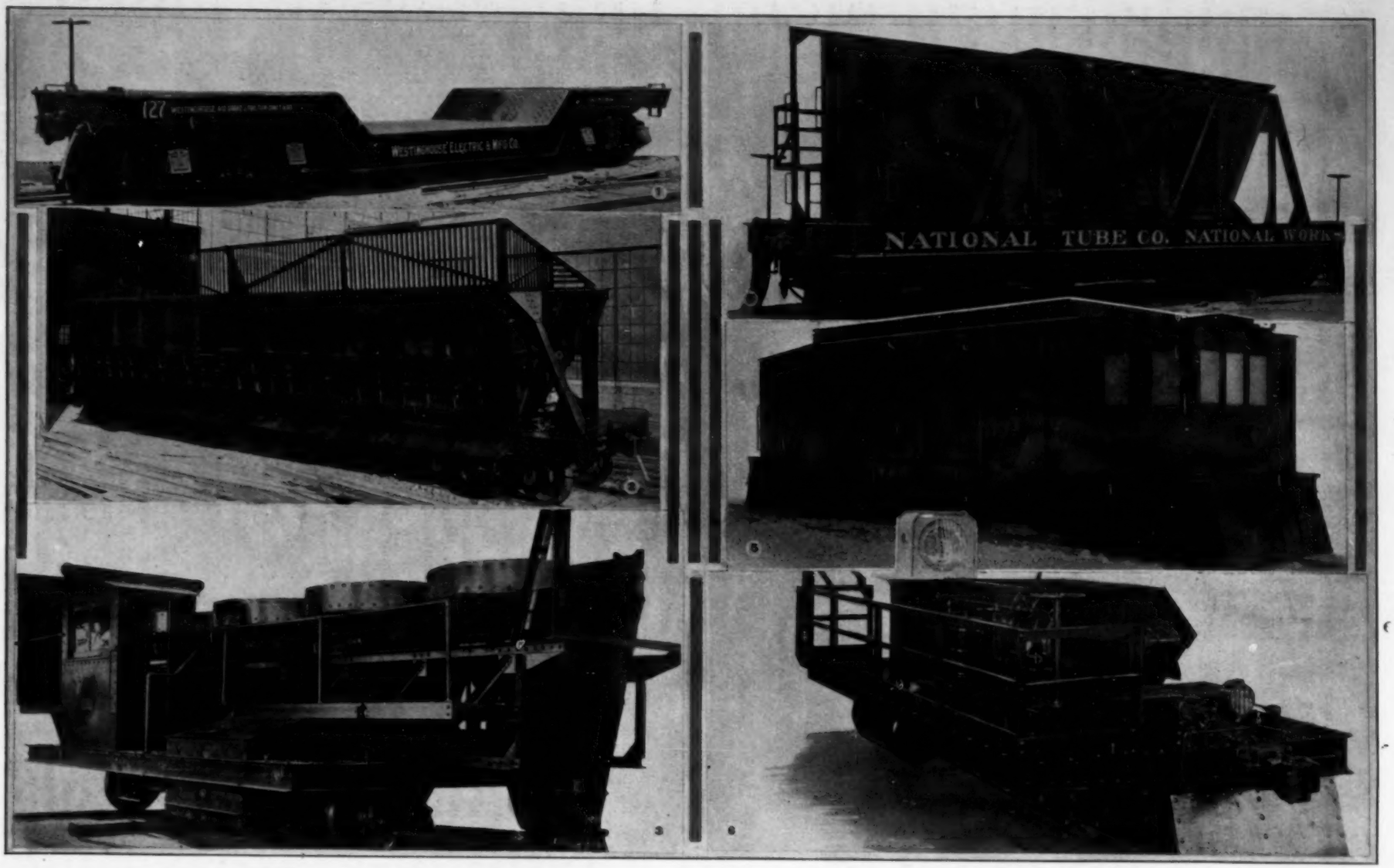
It seems to the writer that much of the confusion on the subject of costs in the past has been due to a misconception of the subject. The intimate relation between production and costs has not been sufficiently recognized, for the accountant has looked upon costs as a bookkeeping proposition, whereas, in truth, costs are much more closely connected with engineering and production than with the subjects of bookkeeping and accounting.

If the engineer will recognize this fact and insist that money spent without any corresponding production must be kept separate from that which was productive, either directly or indirectly, many of the apparent contradictions with which we are so frequently faced will be eliminated.

I am perfectly aware that it is extremely difficult to eliminate all of such expense, but I am also aware of the fact that it is extremely easy to eliminate a large proportion of it. The solution of this problem is one of the economic questions which the war will shortly force to our attention, and I insist that it is primarily a question to be solved by engineers rather than by financiers.

Large Blast Furnace

Albert Thomas, minister of armaments, Paris, has announced that the French authorities have recently completed what is believed to be the largest blast furnace in Europe. It is near Caen in Normandy, on the spot where Herr Thyssen, the great German ironmaster and the Krupp interests obtained a foothold before the war. It also is announced that France is now mining thousands of tons of hitherto untapped ore from the Normandy basin.



THESE CARS ARE EFFECTING HUGE ANNUAL SAVINGS IN AMERICAN INDUSTRIES

Fig. 1—This transformer car is designed to carry 75 tons on its center deck—The load is carried close to the track to permit shipment of transformers of heights impossible with the ordinary flat car. Fig. 2—Coke-quenching car, capacity 12 tons—This car is used to carry the hot coke from the ovens to the screening statoin—It has cast iron floor plates. Fig. 3—Coke transfer car, 35 tons capacity—The hoppers of this car are lined with manganese steel wearing plates—The doors are operated by compressed air. Fig. 4—Sixty-ton ore car used to transfer ore from the stock pile to the furnace larries—The doors are electrically operated. Fig. 5—Coal charging car, capacity 16 tons, used for charging ovens of by-product coke plants—The swab crane for cleaning up-comers is a unique feature. Fig. 6—Blast furnace scale charging car, 15 tons capacity—The scale is indicating and recording—Compressed air opens the doors.

Building Cars to Serve Industries

A Brief Description of the Methods Employed and the Equipment Required in the Manufacture of Industrial Cars—Many Types Required for Mines, Furnaces and Mills

BY W. S. DOXSEY

BETWEEN wheelbarrows and modern iron ore and coke-handling cars, representing improvements from pedestal to capital in industrial vehicles, lies a period of industrial transformation embodying the basic fundamentals of economical plant operation and considerable engineering skill and progress. In view of the great strides made during recent years in this field, it is interesting to note that the Atlas Car & Mfg. Co., Cleveland, originally started as the Cleveland Wheel Barrow & Mfg. Co. This company was organized by E. F. Wright, deceased, father of S. D. Wright, vice president and general manager of the present company. In 1896, the business was reorganized and incorporated as the Ball Bearing Wheel & Mfg. Co. and a various assortment of brick cars and steel dump cars were added to the output in addition to ball-bearing wheels on axles and steel wheelbarrows.

The erection of a plant for the production of bolts and the rapid expansion of this new business together with increased demand for industrial cars naturally divided the interests of the company into two distinct fields. It was therefore decided to suggest by name the nature of the products manufactured. Consequently, the firm again changed its name, this time to the Atlas Car & Mfg. Co. and the Atlas Bolt & Screw Co. The institution is a single corporation, all the stock being issued under the name of the Atlas Bolt & Screw Co. Production soon passed the capacity of the plant as first enlarged. The company purchased a 6-acre site in 1912 and since that time has erected a car shop and car-shop addition and a bolt and screw shop.

The buildings are well lighted, windows occupying the sides with the exception of the base walls. Additional natural light is admitted by skylights. For night work, incandescent lamps with enamel reflectors arranged near the roof furnish light of sufficient intensity without glare or shadows. Where concentrated light is necessary for machine-tool operations, individual lights are employed. Heating is accomplished by a system of steam pipes hung beneath the roofs of the bays.

The car-erecting shop, as indicated in Fig. 7, is approximately L-shaped. The buildings are of brick and steel construction and are provided with durable floors of brick blocks laid on concrete. Material is moved into the shop and cars are erected in numerous instances on the standard-gage railroad tracks which run through several parts of the shop. This permits of easy shipment of completed cars to purchasers. Narrow-gage industrial tracks traverse the shop buildings at convenient intervals. The long, rectangular portion of the shop is served by a 10-ton traveling crane built by the Northern Engineering Works, Detroit, and one of like capacity furnished by the Whiting Foundry Equipment Co., Harvey,

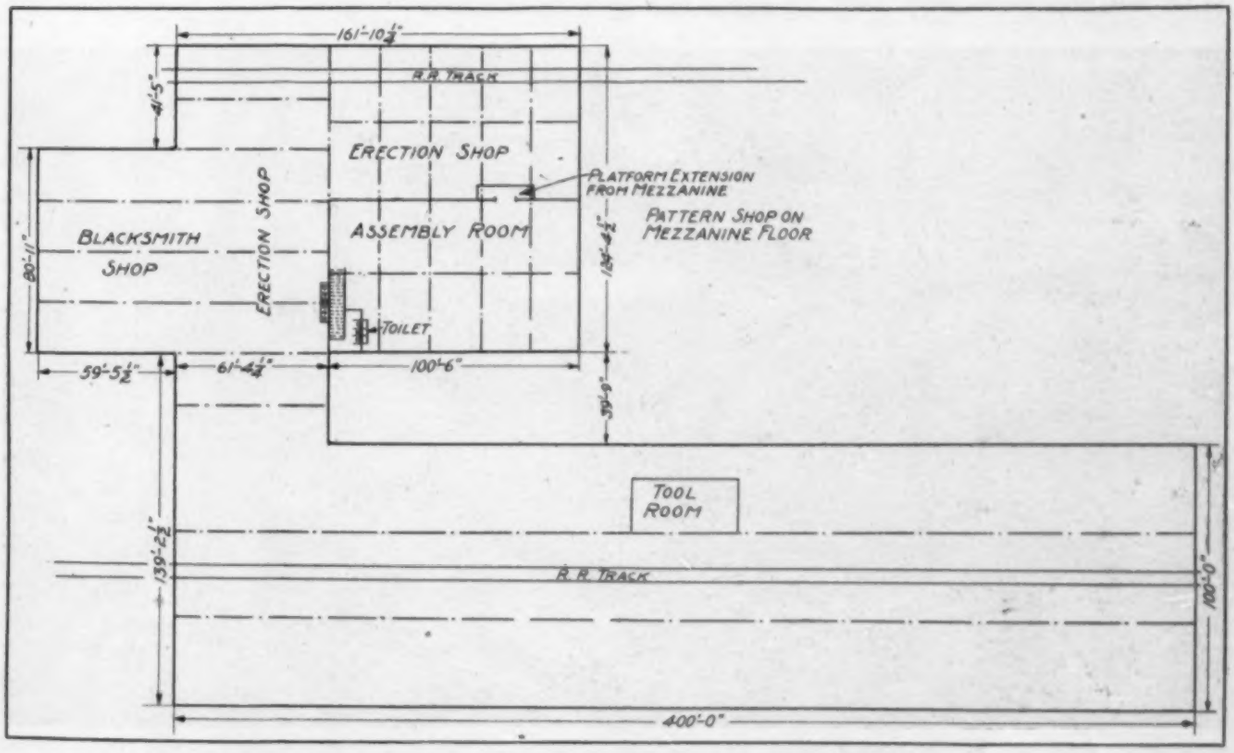


FIG. 7—GENERAL LAYOUT OF THE CAR-ERECTING SHOP OF THE ATLAS CAR & MFG. CO.

FIG. 8—A CORNER OF THE ERECTING SHOP SHOWING A PLATFORM OF AN OVEN-CHARGING CAR AND A COMPLETED COKE QUENCHING CAR IN THE BACKGROUND

FIG. 9—AN ORE CAR IN THE CAR SHOP RECEIVING THE VARIOUS AUXILIARY EQUIPMENT CONSISTING OF DUMPING MECHANISM AND CONTROL DEVICES

111. The handling of large castings and other heavy pieces is further facilitated by 10 jib cranes built by the Atlas company and equipped with air cylinders or chain hoists as the work and location demand. Monorail and two-rail hand cranes are arranged along the south bay of the building.

The main erecting shop is almost square in shape. It is served by two 25-ton traveling cranes built by the user. This shop, recently completed, is devoted to the construction and assembly of large cars such as coke-quenching and coke-oven charging cars. Facilities are provided in the blacksmith shop for shaping forgings and bending heavy parts. On the mezzanine floor a well-equipped pattern shop is maintained to prepare special templates from which patterns are cut for the irregularly shaped hoppers on coke-oven cars and other similarly odd-shaped parts. The basement of the new building is devoted to the fabrication and assembly of the many small, light parts that enter into the construction of industrial cars.

Progressive Construction

Construction of cars in the main erecting shop is so arranged that the progressing component parts of the cars move toward the standard-gage track at the extreme side of the shop as the various operations are completed. In the first stages of erection, the parts after being cut to size and shaped, are punched and riveted. Girders are prepared for the side and bottom plates which are assembled on the framework to form the body of the car in the second stage of construction. While work on the car bodies is progressing, the trucks are assembled and placed on the railroad track ready to receive the completely assembled body. After the body is mounted on the trucks, accessory equipment such as pumps, controllers and current collectors are installed and the car is ready, after inspection, to ship on its own trucks to the purchaser. Cars of unusual size and of wide gage such as coke-oven charging cars are completely assembled, tested and knocked down for shipment. A view of the erecting shop showing the platform of an oven-charging car and a completed coke-quenching car is illustrated in Fig. 8. A small car for blast furnace pur-

FIG. 10—BENT GIRDERS TO BE USED FOR A SPECIAL CAR DESIGNED TO CARRY HEAVY TRANSFORMERS

poses practically completed on one of the several railroad tracks is shown in Fig. 9.

The long, narrow portion of the shop is devoted to the construction of smaller industrial cars including storage battery and trolley mine and shop cars. The building is divided into three bays, construction work being carried on in the central bay and machine work and fabrication of parts in the side bays. One of the side bays is given to the various plate bending machines, punches, shears and rivet-heating furnaces; the other is equipped with machine tools. The larger tools have individual motor drives.

Figs. 10 and 11 show work in progress on two usual types of cars which were started in this part of the plant before the new main erecting shop was completed. The heavy, bent girders shown in Fig. 10 are for use on a car designed to carry huge transformers. A view of a completed transformer car is shown in Fig. 1. One type of ore car recently constructed is designed for a capacity of 100 tons. This car will be propelled by four electric motors and may be operated from cabs at both ends. The net weight of the car is 205,000 pounds. Due to the varying existing conditions it is impractical to standardize cars for blast furnace and steel mill purposes. For example, the gage of the track for oven-charging cars is far from uniform. The design of each car must conform with the distance of the rail center to the hopper door which is different for almost every installation. Other specifications, such as the height of the car, the location of the cabs and the type of drive, vary widely. Cars usually are built from specifications furnished by the user. More progress has been made toward the standardization of small electric locomotives for manufacturing plants and mines, although some easily accomplished changes are necessary in almost every installation.

A High Voltage Series Relay

The General Electric Co., Schenectady, N. Y., has made several improvements on its high voltage series relay used for the automatic tripping of oil circuit breakers. The mechanism of the new relay consists of two elements placed one above the other.

The upper element, consisting of a solenoid, counterbalancing weight, and a mechanism for transmitting the motion of the solenoid plunger to the operating rod, is mounted on a high tension insulator, and is isolated from the ground. The lower element consists of relay contacts, cover for contacts, calibrating parts and a time limit arrangement.

The solenoid is connected in series with the circuit and one end of the coil is electrically connected to the solenoid frame to avoid static stresses. This upper portion of the device does not require adjustment after installation. When the solenoid or relay operates, the motion of the plunger is transmitted through a wooden rod to a set of double-break switch contacts which close when the solenoid plunger rises on account of overload or short circuit, and which open again by the weight of the plunger when the abnormal conditions are removed.

The relay is calibrated from normal to three times normal current, the calibration being made by a sliding weight. Time-delay adjustment is made by an oil dash pot. The contacts, mechanism and solenoids are the same for all voltages from 15,000 volts upward; but the coils vary in capacity according to the normal ampere capacity of the line. The insulators for mounting the solenoid vary according to the line voltage and the factor of safety required. The relay is for use when the cost of high potential transformers for tripping purposes is prohibitive.

Weld Strength of Pipe

WELDED pipe made of wrought iron or steel, is always subjected to a hydrostatic test before leaving the mill. The range of pressures applied in ordinary practice is from 250 to 2000 pounds, most sizes of standard weight pipe being tested under a pressure of 750 to 1000 pounds per square inch. In the hydrostatic test bursting load of short duration is evenly applied. Further tests reveal the resistance to splitting at the weld under the torsion, tension, or compression stresses which are encountered in cutting, threading, bending, and installing the pipe.

The strength of the weld in iron and steel pipe has always been open to some question, as experience has shown that new pipe will sometimes split under stresses apparently much below the hydrostatic test pressures. If the pipe is well made and from a good grade of material, the percentage of such failures should become negligible.

In order to minimize the percentage of weld failures, the A. M. Byers Co., Pittsburgh, subject all crop ends of pipe to a crushing test. The greatest number of defects naturally will occur at the ends of the pipe, and the crushing test leads to the detection and rejection of a defective length of pipe.

A series of flattening tests on pipe, which had already been subjected to the mill tests referred to, have been carried out by Edward A. Klages of the University of Pittsburgh. One hundred and sixty pieces of pipe of various sizes, both buttweld and lapweld, were tested with the pieces placed at varying angles to the vertically applied pressure.

An analysis of the tests shows that of the 160 pieces of buttweld and lapweld pipe tested, including all sizes from 1 inch to 12 inches of different weights, only 20 pieces, or 12½ per cent showed the first signs of failure at the weld. A summary of the failures follows:

SUMMARY OF TESTS

	Pieces tested	No. weld failures
1-inch regular buttweld	8	4
2-inch regular lapweld	8	0
4-inch regular lapweld	8	0
8-inch regular lapweld	8	0
12-inch regular lapweld	8	0
1-inch extra heavy buttweld	8	4
2-inch extra heavy lapweld	8	2
4-inch extra heavy lapweld	8	0
8-inch extra heavy lapweld	8	0
12-inch extra heavy lapweld	8	0
1-inch double extra heavy buttweld	8	4
2-inch double extra heavy lapweld	8	0
3-inch double extra heavy lapweld	8	0
4-inch double extra heavy lapweld	8	0
2-inch—4-pound tubing—lap weld	8	2
2-inch—4½ pound tubing	8	0
3-inch—8½ pound tubing	8	0
3-inch—10-pound tubing	8	1
4-inch—11-pound tubing	8	0
4-inch—11¾-pound tubing	8	3
	160	20

Of the weld failures, 12 were in the 24 pieces of 1-inch buttweld pipe, and only eight weld failures occurred in 136 pieces of lapweld pipe of all sizes. The results of the tests were a little surprising in that they showed in the main less tendency to fracture at the weld than elsewhere. This leads to the assumption that the weld in wrought iron pipe is at least as strong as the body metal for a like application of stress. This was shown also by the fact that the position of the weld with respect to the applied load had no influence upon the location of the place of initial failure.

A new type of tap wrench, fitted with a right and left ratchet, and a sliding tee-handle to enable it to be used in corners or places where working space is restricted, was recently placed on the market by the Moss-Ochs Co., Cleveland.

Efficient Use of Coal is Patriotic

Judicious Buying Comes to Naught if Prodigal Methods Are Tolerated in Boiler Room—Elimination of Waste Not Difficult and Makes for Lighter Bills—Records Serve as Guides

BY E. P. LATER

IN A PRECEDING article the selection and purchase of coal was discussed at some length and suggestions were given regarding the methods to be employed. This is not the only problem confronting the user of coal, however, for it is one thing to buy this material and an entirely different matter to handle it in such manner as to render available the greatest possible amount of the energy which it contains. Therefore, it may be helpful to consider some of the ways in which elimination of waste in the production of steam may be brought about. This is a subject worthy of the most serious consideration at any time, for the yearly loss through carelessness and ignorance in using coal amounts to hundreds of millions of dollars; but with the present high prices and the uncertainty of the market the opportunities for manufacturers to save money and at the same time perform a distinctly patriotic service in helping to relieve a serious situation created by the unusual conditions are very great. Steam generation is at best a rather wasteful process and is subject to certain large and practically unavoidable losses. Consequently, whatever money and efforts are expended in the way of reducing these losses to the lowest point may be considered wisely invested.

Two Sources of Loss

For our purposes we may consider the problem of cutting out waste in the boiler room to be divided into two parts: putting the plant into the best possible condition, physically, aside from whatever inherent limitations the equipment may possess, and making certain that the firing methods are correct in every way for the kind of coal and type of equipment employed, the conditions of service, etc.

Not all boilers are correctly designed or perhaps even properly installed and in such cases the only thing that can be done is to correct as far as possible those short-comings which can be remedied at reasonable cost. There is no excuse, however, for those losses which are the result of neglect and lack of proper maintenance. For example, leaky settings may allow large quantities of air to be drawn in, thus cooling down the hot gases of combustion and needlessly wasting coal. Settings should be kept tight by going over them frequently and filling up all cracks. Baffles, too, should be kept tight and in good condition, otherwise loss will be incurred through premature escape of the hot gases and heat which should be utilized in the boiler will pass out of the chimney. Leaky valves and fittings may be the source of some loss of steam and, if only for the sake of appearances, should be properly attended to. Much more serious losses may be occasioned by poor or inadequate insulation of the steam lines. An uncovered, heated pipe gives off heat very rapidly and if important wastage in this way is to be avoided all lines must be thoroughly covered with some good insulating material of sufficient thickness to cut down radiation as much as possible.

Know Your Boiler Room

Buying coal by analysis and firing it by chance is just about as consistent as installing an intricate, process-saving machine and neglecting to put out one word of instruction. It is such an ill-considered attempt at economy that oftentimes, considering the initial expense, it is actually wasteful.

Just because coal comes in box cars instead of by mail and is weighed by avoirdupois instead of troy weight is no sign it is entirely devoid of money-saving possibilities. On the contrary, it will respond surprisingly quick to efficient handling.

Proper firing of coal is a science. Soot, scale, improper combustion, incorrect draft and overheated flue gases are the parisites that prey unseen upon economy. Indeed, for many manufacturers the day of conserving coal for economy's sake alone is past; the coal famine demands that less coal be made to go farther. For this reason, if no other—and there are others—this article is exceptionally timely.

Another matter, whose importance can hardly be over-emphasized, is that of keeping the boiler tubes as free as possible from scale and soot. Scale, which is formed by the deposition of the various mineral impurities present in the water, varies according to the character and amount of these foreign materials from a more or less soft substance to a very hard and strongly adherent incrustation which is removable only with difficulty. It hinders to a very marked degree the transfer of heat from the tubes to the water in the boiler. As a consequence not only is heat wasted and the capacity and efficiency of the boiler reduced, but the danger from overheating and burning of the tubes is greatly increased. Even a comparatively thin layer of scale may raise the coal consumption several per cent.

Scale is a Waster

Formation of scale can often be prevented to a considerable extent by preheating the water, in feed-water heaters or otherwise, since the mineral matter producing certain forms of hardness in water is precipitated at a comparatively low temperature. But where much trouble is encountered from this source the question of treating the water chemically in order to remove the objectionable ingredients should be carefully gone over. Of course, some waters are unfit for boiler use under any circumstances, inasmuch as no amount of treatment short of distillation would purify them sufficiently to give satisfactory service, but in many instances an excellent boiler water may be produced at small expense. Naturally, the treatment required depends on the character of the mineral constituents and, briefly, consists in mixing the water with a solution of lime, soda ash or the two combined.

In order to give a clearer understanding of the subject it may be said that the principal scale-forming ingredients of waters are the carbonates and sulphates of calcium and magnesium, and it is to the removal of these salts that the chemical treatment is largely directed. Heating or treatment with lime alone is efficacious in the case of waters containing the bicarbonates of calcium or magnesium. When lime is

used it results in the latter combining with the carbon dioxide present either as the free gas or in the form of bicarbonate, with the production of insoluble calcium carbonate which then precipitates out. As soon as the carbon dioxide is removed from the soluble bicarbonates of calcium and magnesium the normal carbonates are formed, and as they are insoluble they settle out at once.

The soda solution used in water treatment usually contains both the carbonate and hydrate of sodium and serves to remove calcium and magnesium sulphates.

Boiler waters ordinarily contain more or less of both the carbonate and sulphate of these two elements and when the combined lime and soda treatment is given the action is along the lines indicated above the soda breaks down the sulphates, with the formation of insoluble carbonates, and the lime breaks up soluble bicarbonates and absorbs free and combined carbon dioxide.

Perhaps a word about the use of the so-called boiler compounds may not be amiss here. There are on the market various preparations, which usually consist of soda and some organic substance, such as tannic acid, for example, which are introduced into the boiler along with the feed water for the purpose of preventing the formation of a hard and firmly adherent scale. The soda breaks up the sulphates of calcium and magnesium, while the organic matter tends to disintegrate and remove whatever scale has already been formed. For various reasons it is not advisable to attempt to remove heavy incrustations in this manner, consequently these compounds should only be used in a clean boiler.

Should Blow Out Tubes

Scale formation is something which cannot be entirely avoided, although much may be done in the way of lessening it by appropriate treatment of the water, but efforts should be made to keep the tubes as free as possible from deposits of this sort. Practically, this means the use of good water and frequent and thorough cleaning of the boiler.

Soot, which is fine unburned carbon with more or less mineral matter mixed, collects in considerable quantities in and around the tubes and is objectionable for the same reason that scale is. It is a very good heat insulator and markedly retards the transmission of heat to the water, thereby making it necessary to burn more coal than would otherwise be required. The formation of soot can not be prevented, but it may easily be removed by blowing out the tubes with a jet of steam and this should be done at frequent intervals.

Coming now to the combustion of the coal itself, this is perhaps more involved than it appears to be at first sight. When fresh coal is thrown upon the hot fuel bed of a furnace a number of things take place. First of all the air spaces in the bed of coke are choked to a greater or lesser extent, thus cutting off part of the air supply. Then the moisture in the coal is rapidly evaporated, a process which absorbs heat and tends to lower the temperature of the furnace. Carbon monoxide and hydrogen are formed through the action of the water or steam on the red-hot coke, with the further absorption of heat, although the latter is again given out if sufficient hot air to burn these combustible gases is present. Finally, the distillation of the volatile hydrocarbons in the coal begins and under certain conditions a considerable portion of these may escape unburned, causing a further loss of the available energy in the coal.

Records are Helpful

"The keeping of accurate and comprehensive records is one of the secrets of the successful conduct of business and this applies as much to the boiler plant, whose sole business is to generate steam as economically as possible, as to anything else. The ultimate measure of the efficiency of such a plant is the cost of making steam and this can only be determined by the aid of properly kept data concerning the weight of coal burned and the quantity of water evaporated."
—E. P. Later.

A large part of the problem is, then, to secure and maintain conditions which will insure the complete combustion of the inflammable gases given off and the solid residue of coke or carbon which is left on the grates. In the last analysis this depends on the presence of enough oxygen to unite with these and burn them to carbon dioxide, the ultimate product of the combustion of carbon. Substances containing both carbon and hydrogen, for example, the volatile matter driven off from the coal, are resolved into carbon dioxide and water, which at the temperature of the flue gases passes off with them as steam. Practically, the attainment of such conditions is a difficult matter and even to approximate them requires careful attention. Moreover, there are certain points which must be constantly kept in mind if the best results all around are to be obtained. It is easily seen that, inasmuch as the energy contained in coal is made available only upon burning the latter, if combustion is not complete a varying but considerable part of this energy will be lost, as far as utilization in the boiler is concerned. It may not be so easily realized, however, that if too much air is admitted to the furnace a serious loss of heat may result, even though combustion in this case may be practically perfect.

Proper Draft a Requisite

This is a logical consequence of the fact that air contains only about 20 per cent of oxygen, the balance being nitrogen, mainly, with a small amount of several other inert gases. For every pound of air admitted to the furnace several pounds of nitrogen must be heated to a high temperature and allowed to pass up through the chimney, thereby causing a very considerable, although unavoidable waste of heat. A smokeless chimney is commonly regarded as a sign of good combustion and therefore indicative of skillful firing, and so it may be. On the other hand, this freedom from smoke may be obtained at the expense of a large amount of coal wasted in consequence of the passage of great quantities of highly heated gases out through the chimney. It may thus be simply a case of flying from one evil, only to fall victim to another, and perhaps greater, one.

Proper regulation of the draft is therefore an important item of the fireman's job unless automatic draft regulators are part of the equipment. For every coal there is a certain quantity of air which will give the best results; if more or less than this amount is supplied a loss of heat will take place. It is almost impossible to guess the right amount, although this is attempted far too frequently, but it is possible to determine it with a good deal of certainty through analysis of the flue gases, for by knowing the composition of these it is easy to see just what the conditions are.

It was stated above that carbon dioxide is the ultimate product of the combustion of carbon. It is a colorless, odorless gas which is neither inflammable nor a supporter of combustion. It can easily be detected and estimated and the amount found in the flue gas gives valuable information as to the efficiency of combustion.

There is still another oxide of carbon which is found in the waste gas and known as carbon monoxide. As its name indicates, it is composed of one part or atom of carbon combined with one atom of oxygen in the same way carbon dioxide is composed of one atom

of carbon combined with two atoms of oxygen. Carbon monoxide is likewise a colorless and odorless gas and is formed by the partial or incomplete combustion of carbon, but unlike the dioxide it is inflammable and in the presence of a sufficient supply of air oxygen can be ignited and burned to the dioxide. In other words, there are two stages in the oxidation of carbon, the first stage resulting in the formation of the monoxide, the dioxide then being formed if the conditions are such as to permit it. Now, the factory manager may not be particularly interested in the oxides of carbon, but their application to the subject in hand arises from the fact that one pound of carbon when burned to the monoxide yields somewhat less than 4500 British thermal units, while one pound of carbon burned to the dioxide, that is completely burned up, gives over 14,000 British thermal units, or more than three times as much heat. When we find carbon monoxide in the gases passing up the chimney it means that insufficient air has passed through the firebed, in consequence of which some of the carbon of the coal has not been completely burned up, and therefore wasted so far as making steam is concerned. Analysis of the exit gases shows pretty definitely at once, through the presence or absence of monoxide, whether enough air has been admitted.

Gas Analysis an Aid

In passing it may be remarked that the presence of monoxide is also objectionable for the reason that it may cause serious explosions if it is ignited during its passage through the boiler passes or elsewhere on its way to the chimney.

It follows from what has been said above that a high percentage of carbon dioxide in the flue gas, with the monoxide absent entirely or present only in small amounts, usually indicates that furnace conditions are satisfactory, or at least that sufficient air is being admitted. High monoxide ordinarily accompanies low percentages of dioxide and indicates, of course, that combustion is not complete. It is rather difficult to set any definite figure for the amount of carbon dioxide which should be present. About 21 per cent is the theoretical quantity, but inasmuch as perfect conditions are never attained in practice from 12 to 15 per cent is considered to be about the limit ordinarily obtainable and indicative of skillful and intelligent handling. Naturally, the amount varies with the design of the furnace, the quality of the coal, service conditions, etc., and may fall to 10 per cent or below without necessarily reflecting on the ability of the fireman. It may be noted here that the carbon dioxide readings alone are not considered to be entirely reliable data on which to base judgment regarding operating conditions or, rather, they tell only part of the story and determinations of the carbon monoxide, oxygen and nitrogen should be made from time to time in order to ascertain furnace conditions more exactly.

Methods of Gas Analysis

For making the gas analyses a small, portable outfit, capable of estimating these four gases, may be used, or a carbon-dioxide-recording instrument may be installed, in which case its readings should be supplemented as indicated above. In any event, however, the information which may be obtained in this way is too important to be overlooked, for the small first-cost of such apparatus and the expense of making the analyses may be very slight when compared to the savings which are made possible.

The keeping of accurate and comprehensive records is one of the secrets of the successful conduct of business and this applies as much to the boiler plant, whose sole business is to generate steam as economically as possible, as to anything else. The ultimate measure of the efficiency of such a plant is the cost of making steam and this can only be determined by the aid of properly kept data concerning the weight of coal burned and the quantity of water evaporated. It is hardly enough to know the total weight of coal delivered to the boiler room, for then the consumption by periods can only be approximated. It is much better to weigh it as it is brought on the floor, in comparatively small amounts, as a much closer check may be kept of the quantities burned at different times of the day. It is also customary in some plants to weigh the amount of ash produced under the boilers for, by comparing this with the percentage of ash found by analysis of the coal, a means of determining the efficiency of the grates is afforded.

The water evaporated may be determined either by measuring the amount going into the boilers or by determining the steam given off, by means of a steam flow-meter. If the latter is employed a close watch of the steam consumption may be easily maintained, which may be a decided advantage in some cases. Further, the installation of a meter of this sort for each boiler or group of boilers makes it possible to check up the performance of such units very accurately and thus determine whether each is working at its full efficiency.

It is also important to know the feedwater temperature, otherwise it is very difficult to tell whether the full heat value of the exhaust steam is being obtained. Naturally, the higher the temperature of the water which enters the boiler the less coal will be required to turn it into steam, therefore it will pay to watch this point rather closely.

The temperature of the escaping flue gases is another item of the data which are essential to the most economical and efficient operation of the power plant. A good deal of heat is unavoidably lost through the chimney. It is not possible, or at least practicable, to reduce the temperature of the waste gas below a certain point, but every effort should be made to keep it as low as possible and for the purpose of securing definite information on this point a good pyrometer or thermometer should be installed and readings taken frequently.

Unduly large chimney losses may be ascribed to at least two causes. A large excess of air over that required for complete combustion of the fuel will absorb a very considerable amount of heat in being raised to the high temperature obtained within the furnace and then carry this heat with it out into the air, where it is utterly wasted. This excess does not necessarily come through the fuel-bed. Much of it may leak in through the settings and from keeping the doors open too much of the time.

Every Plant a Problem

Soot and scale on the tubes is another cause of high flue temperatures, which makes for high chimney losses. The reason for this is simple and was stated before: these substances retard the transmission of heat to the metal and from this to the water. Consequently, only a part of the available heat of the gases can be absorbed in the comparatively short time that they are going through the passes, and they enter the stack still retaining a large amount of the heat which should have been given up to the water.

Oftentimes those in charge of a boiler plant have no reliable information as to what it is really capable of doing, although this is a very valuable, even essential, thing to know. The limitations and possibilities of a plant should be thoroughly recognized and understood. Every engineer knows that boilers are ordinarily capable of being worked considerably over their nominal rating when properly handled, and up to a certain point there may be no serious loss in efficiency. In the absence of reliable information as to just how far this overloading may be carried he is working in the dark in many ways as, for example, when it comes to the question of deciding whether additional equipment should be installed

to meet an increased demand for power.

In the same way, if the lowest figure for which 1000 pounds of steam can be produced has once been definitely established under actual operating conditions, continuous records render it easy to ascertain the day-by-day performance, whereby any deviation from the standard can be detected at once and the remedy sought without costly delay.

Finally, although instruments are an invaluable aid in the efficient operation of a power plant, they cannot do everything and the fact that the human element is present in a large measure should not be lost sight of. Practically, this means that the intelligent and sympathetic co-operation of the firemen must be enlisted if the best results are to be obtained. To this end they must be made to see that it is as much to their interests as any one else's to avoid waste of coal in every way—and it may be said that a well-planned bonus system is a powerful incentive toward acquiring the desired point of view. Further, the official in charge of the power plant should regard it as his duty to see that his men are possessed of the knowledge requisite to the proper discharge of their tasks. If they do not already know it, they must be taught the methods of firing best suited to the type of coal, the kind of equipment and the conditions of service. They must learn that fires should not be worked too much, how and when fires should be cleaned—as otherwise loss of fuel may be occasioned—how properly to handle the fires when the demand for steam is light and how to raise steam quickly to meet a peak load. It is much easier to let the safety valve blow off than to regulate the dampers, but the results are not nearly so satisfactory when the time to settle the coal bill comes around. And there is the further consideration that the mere ability to get along with less coal during the next few months, or until conditions become more settled, may be quite as important as the saving in dollars which is thereby entailed.

Takes Over Process

The Continuous Zinc Furnace Co., Hartford, Conn., which developed the Johnson process of electric smelting zinc-lead ores, saving all the values, zinc, copper, lead, gold and silver, has sold the major right, title and interest in this process to the American Smelting & Refining Co., the largest interest in the lead and silver business in the world. The purchaser will exploit the process, carry along a commercial test and build another large furnace at one of its western plants. Woolsey McA. Johnson, the inventor of the process, who carried though the consummation of the deal in the west, will assist the company's experts in respect to future inventions in this field, although he will devote most of his time to other inventions in similar lines. The process uses ores now commercially valueless and largely eliminates labor.

Japan Encourages Iron Industries

A law has been put in effect by Japan having as its object the encouragement of the iron and steel industries of the nation.

The main provisions of this measure are: That iron and steel works with an output of not less than 35,000 metric tons per annum will have the right to exclude from ownership the holders of property on which it is necessary to locate the works. That works turning out not less than 5250 metric tons per annum will be exempt for 11 years from business and income taxes, and from all forms of local and municipal taxation, as well as being allowed to import free of duty the machinery, etc., required for the works. The figure of 35,000 metric tons is based on the assumption that it is not economical to erect works with a furnace capacity of less than 100 tons per working day for 350 days, while the figure of 5250 tons is based on a production of 15 tons per day for the same period, this amount being fixed for the benefit of the smaller concerns. With great industrial activity existing in the country and the shipbuilding boom at its height, the passing of this new law has resulted in the launching of a number of new undertakings.

The World's Most Powerful Locomotive

In order to more adequately handle the huge amount of traffic which must daily pass through the mountainous stretch of territory between Johnstown and Altoona in eastern Pennsylvania, the Pennsylvania railroad has placed into service an electric locomotive said to be the most powerful in the world.

The locomotive can exert a maximum horsepower of 7000, which is greater than that developed by many electric light plants in towns of 25,000 population. It weighs 250 tons and is slightly over 76 feet in length.

POWERFUL ELECTRIC LOCOMOTIVE ON THE PENNSYLVANIA

The electrical equipment is so designed and constructed that the locomotive can haul the heavy trains up hill and coast down hill at the same speed of 20 miles per hour. The motors become dynamos or generators in the latter case, resulting in braking action without the use of air. Air brakes thus are simply held in emergency and used in bringing the train to a dead stop.

Mechanical parts of the locomotive were built at the Juniata shops of the Pennsylvania railroad, while the electrical equipment was manufactured by the Westinghouse Electric & Mfg. Co., East Pittsburgh.

Prevention of Blast-Furnace Slips

Suggested Remedies for Overcoming the Abnormal Conditions Which Lead to the Ejection of Coke, Ore and Limestone From the Furnace Top—Theory and Prevention of Carbon Deposition

BY F. H. WILLCOX

A BLAST-FURNACE slip is always preceded by hanging of the charge in the furnace, where, because of irregularity in practice, or the augmenting of some abnormal or detrimental factor, a part of the charge becomes wedged. Sooner or later, from a few minutes up to several hours, this material gives way and falls inside the furnace; this sudden descent of material has been given the name slip.

The mechanism of blast-furnace slips, the chemical and physical conditions causing them, and the various theories to account for irregular movement of stock in the furnace have been an attractive field for discussion and speculation among blast-furnace and technical men for many years, because the subject related to the attainment of regular practice, and consequently to tonnage, quality of iron, and costs, and also to the safety of the men and of the equipment.

At many plants small slips are of daily occurrence, usually frequent, and many large furnaces apparently work only by slipping. As a rule, such slips cause little disturbance to furnace processes and offer little hazard to life or property. If this were not so, practice and work about blast furnaces would have become intolerable many years ago. However, chronic and excessively heavy slips may develop and may disarrange the working of a furnace for weeks at a time, in addition to introducing a considerable hazard to the force. After a furnace has hung for some time the charge may descend quietly, or gas and dust may be blown from the bleeders or explosion doors for several seconds, or the stock may fall so heavily that the impact shakes the furnace foundations or bursts the bosh. Sometimes the slip becomes so violent that it resembles an explosion. There is a deep, heavy roar, and dust and gas are ejected from the bleeder 150 feet or more in the air and from the explosion doors; a sheet of flame plays about the furnace stack, hiding the top; and large quantities of ore, coke, and limestone are ejected over the yards and tracks. Sometimes the top is blown off and the side is split, and in some instances blast furnaces have been completely destroyed. This explosive type of slip is prolonged rather than instantaneous, as it lasts five to 15 seconds.

Formation of Cavity

Whenever the charge sticks or hangs a cavity is formed at some point in the furnace. For every 40,000 cubic feet of air blown per minute there is burned approximately 730 pounds of coke, which will occupy a space of about 25 cubic feet.

Accompanying the coke is 1460 pounds of ore, occupying about 9 cubic feet, and 400 pounds of limestone, occupying 4 cubic feet, making a total of 36 cubic feet of material which is smelted per minute and disappears into the hearth as slag and iron or out the gas offtakes as gas and steam. In 40 minutes, therefore, a cavity about 1200 cubic feet in size would be formed beneath the hanging part, representing in the shaft an average depth of about 5 feet or at the top of the bosh about 3 feet. Above this cavity, which is filled with gas, is a column of stock weighing, roughly, 25,000 pounds per foot of height, so that the total weight of the column of stock above the cavity ranges from 1,500,000 pounds when hanging takes place at the bosh to 250,000 pounds at 10 feet below the top.

The effect and appearance of a slip depends upon where the hanging started, the depth and shape of the cavity, the pressure of the gas beneath, the weight of the suspended column, the physical character of the ore, and the manner of falling. There being no means of direct observation, one can only surmise the mechanism of a slip from the correlation of a great deal of experience, data, and observation of various men. Some slips have been so violent that they have been termed explosions, and many furnace men believe that a true explosion may take place under certain conditions, this theory being based on the fact that the so-called explosion has been observed to follow the slip by an appreciable interval. A knowledge of the various theories of hanging, slips, and explosions is important in order that the most effective steps to prevent their occurring too persistently and excessively may be taken. Hanging of the charge probably takes place throughout the depth of the stock columns, but to distinguish the different causes it may be considered to be divided into two varieties, top hanging and bottom hanging. The causes are quite distinct in each case, but as the location of the hanging or sticking approaches midway between the mantle and the top the causes probably become due to a combination of irregular working, both at the bottom and the top.

Bottom hanging or deep hanging may be considered to take place from the lower bosh to the top of the zone of slag formation and to be due to excessively refractory slag caused by variations in the materials charged or in the blast, fluctuations in silicon content of the iron, or by running regularly on too limy a slag.

Top hanging is entirely different both in occurrence and seriousness from bottom hanging and is more difficult to account for. The most attractive theory has been that hanging is due to the deposition of finely divided carbon on and in the interstices of finely divided and easily reducible ore. This theory has been advanced by furnace men who are familiar with the presence of carbonaceous dust in the charge, as in repairing a furnace it can be noticed that a fine voluminous mass of carbon fills every interstice of the charge, and when a furnace is blown out the walls are covered and the cracks filled with carbon, and also when a furnace slips or rolls a cloud of black dust is frequently ejected.

An argument against carbon deposition being a cause of hanging is found in the behavior of furnaces when they are hanging periodically on top. When the charge slips, often a cloud of black smoke is ejected, which consists mainly of carbon. By the falling of the stock owing to the collapse of the arch the entire contents of the furnace in the upper zones undergo considerable shaking up, and any carbon deposited should be blown out and cease to cause further trouble. Yet in spite of the burden material being free from carbon deposit after a slip, hanging may persist and grow worse after each check and slip. This is taken as indicating that the

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carbon, often ejected in astounding amounts, must have formed after hanging developed, and that its appearance should not be confused or distorted into being the cause.

Another cause of hanging may be found in the tendency of the stock to travel faster in the center of the column, and for fine coke, stone, and ore dust to accumulate on the sides. If the tendency becomes too pronounced there may be lodging or wedging of the interior part of the column on the slowly descending ring next the walls, as such accumulations of tightly packed ore, coke, dust, and lime have been found next the walls.

Theory of Top Hanging

The most apparent cause of top hanging is a combination of carbon deposition in excessive amounts and of mechanical wedging independent of carbon deposition. It is possible that if, on account of irregular charging, or variations in the amounts charged, or in materials, the reactions do not proceed properly and equilibrium is destroyed, then carbon may be deposited in excessive amounts. This deposition may conceivably occur in but one limited segment of the charge, but be sufficient in itself to wedge the adjoining material firmly in the throat of the furnace. Mechanical causes, such as markedly uneven descent of charges, improperly designed gas offtakes, channeling, and obstructions or depressions in walls can also introduce conditions productive of hanging, with consequent carbon deposition.

If a furnace has been hanging on top for 60 minutes, at a point, say, 11 feet below the stock line, it is evident that a cavity 4 to 6 feet deep will be formed beneath the stationary port. Beneath this cavity is a deep column of somewhat dense stock, permeated with gas under pressure, the pressure increasing toward the tuyeres. As the stock column below the cavity becomes lower and shorter the temperature and pressure of the gas in the cavity will increase as long as blast pressure is maintained; but if the blast pressure is reduced by checking the furnace, the pressure in the cavity will slowly drop until it is insufficient to hold up the overlaying wedged column, and the latter falls. If on account of the conical slope of the furnace lining the material falls in a mass like a plunger, the gas below is highly compressed by the weight and velocity of the falling charge. As the compressed gas can not escape to any extent or quickly enough through the lower column, the pressure will continue to build up until the gas bursts up through the weakest part of the falling column, carrying with it any overlying material. This may happen within two or three seconds, the escape of gas resembling an explosion. The uprush takes place almost instantaneously, and, finding easy relief at bleeders or explosion doors, the pent-up gas bursts out at the top, lights with a roar, and coke and ore are vomited up vigorously.

It is only rarely that the wedged column can fall as a solid mass. To slip in this manner the bottom of the mass would have to hang tightly together and the brickwork would have to be smooth and of equal periphery. As a rule the hanging part starts to fall on one side, or piecemeal, from the bottom to the top. The former condition is often indicated by the stock line being lower on one side than the other after a slip, indicating that the gas has probably broken through along the walls and in its escape has taken most of the ejected material from the depressed side. When the hanging part gradually breaks away from the bottom up the resulting ejection of stock is less, owing to the more gradual release in gas pressure.

As a general rule, the higher the scaffold or hanging, or the higher the temperature of gas in the cavity, or the more suddenly and completely the stock falls, the greater the explosion of stock. Also, the finer the ores and the greater the amount of coke, limestone dust, and fines the greater is the expulsion of stock. This latter statement explains why in former days with use of lumpy ores these ores allowed gas to escape throughout the cross section and hanging, and explosive slipping on top was not so prevalent as with the use of finer ores. Because of these various factors it is evident that the time and duration of a slip is somewhat variable. For example, it is well known that a furnace may slip 10 feet without "spitting," whereas at another time a slip of 10 feet will eject huge quantities of ore and coke.

Mechanism of Bottom Slips

Bottom slipping is indicated by burning of gas from leaky blow-pipe and tuyere-stock points, by incandescent gas and coke surging back into the hot-blast main and filling the blowpipes with coke, a distinct shock or shaking of the furnace base or foundations, and usually by a more or less sudden expulsion of gas and dust from the bleeder. The pressure in the cavity beneath a scaffold near the bottom of a furnace is partly relieved when the hanging material falls, as the gas escapes to some extent up through the charge, and the blast mains and stove afford a considerable reservoir to lessen the back pressure. As the escape of gas must be up through a considerable height of burden, the friction muffles or delays any tendency toward an excessively violent outrush in the upper part.

When an arch formed at the bottom falls, it drops into a cup-shaped cavity, in contrast to the falling of an arch higher up where the lining increases in inside diameter with each foot of fall. Therefore, although an arch near the top may possibly hang together in part when it falls, an arch in the bottom must crack and collapse before the overlying column can fall. However, when the yield point is reached in a bottom arch, the great weight of burden above makes the material fall so suddenly and heavily into the empty bosh space that the increase in pressure of the gas, and the impact on the sloping hearth walls may burst the bosh or crack it, especially if it is badly eroded and weakly banded or jacketed. Top slips never come heavily on the bosh, whereas bottom slips do.

Deficient Blast Insignificant

Insufficient volume of blast is seldom the cause of slips nowadays, it being more a feature of former practice where the blowing capacity of the engines did not keep pace with the increase in size of the furnace. A few years ago, when slow driving was for a time emphasized as a means of saving coke and promoting regularity in furnace practice, numerous plants experienced a period of heavier slipping than had been experienced for several years previous, when first driving had been the slogan. Instances are sometimes encountered, however, of deficient volume of blast, for example, in blowing in a furnace where the burden ratio is increased faster than the rate at which the volume of wind is stepped up, or where a furnace sticks tightly and the blowing equipment does not deliver the desired amount of wind against the higher pressure. Serious difficulties are always introduced by this condition, as the low volume of air and gas in its ascent through the charge always selects the easiest path and it does not penetrate the more difficulty preamble parts. As a rule, this causes hot working near the walls, resulting in scouring cinder from an inner core of raw unreduced ore, which requires direct reduction and an excessive amount of coke, erosion of the inwall, and eventually a cold hearth, off-grade iron, and slipping are the results.

Severe slips, loss of ore dust, and similar troubles are often caused by the irregular distribution of blast at the tuyeres. Apart from incorrect design of the hot-blast main and bustle pipe, irregular distribution of air may be caused by the accumulating of dirt in the bustle pipe, by channeling of descending stock by the blast, or by a tuyere opening being directly at the

juncture of the hot-blast main and bustle pipe. Cases in which one side of a furnace is receiving more than its share of blast are characterized by vertical shearing of the column of stock, owing to faster driving on that side; the top of the stock column becomes sloping, being lower over the tuyeres which are driving fast, thus increasingly disarranging the distribution of the top; this distortion of distribution, the folding and shearing of the column, and channeling by gas cause the furnace to work stiffly and irregularly. The combined effect of fast and slow driving and of poor distribution must be combated the resultant sloppy or ironed-up tuyeres, scaffolding, scouring cinder, slipping, and off-grade iron being alternately indicative of almost every possible cause of irregularity. A portable pyrometer should be used at regular intervals to detect this condition, as a higher temperature at any tuyere indicates that more air is entering that particular tuyere. If two or more tuyeres are taking regularly and persistently an undue proportion of the blast the size of their openings should be promptly reduced in order to equalize the blast distribution. The bustle pipe should be cleaned regularly, as large accumulations of dust result in a few months' operation when dirty gas is used at the stoves.

General Proceedure

As a general rule, if hanging develops it is considered advisable not to check the furnace, if this can be avoided. If the furnace will slip of its own accord within 30 to 60 minutes, many prefer to allow it to do so, because if the blast is partly or completely shut off to induce a slip the falling column is apt to pack tightly, and by wedging itself against the walls cause high pressure, repeated hanging, and heavy slipping; but if it falls against a strong ascending gas current its descent is obviously somewhat checked. If in one hour's time a hanging furnace does not settle voluntarily, then it must be made to settle. The longer a furnace hangs the larger is the cavity formed and the greater is the risk of an explosive slip, particularly if the furnace should slip with the blast on. As the cavity enlarges and the pressure of the gas within it increases, there is increasing probability of a violent eruption as the gas bores its way through or about the falling material. Therefore after 30 to 60 minutes steps are usually taken to slip the furnace, it being flushed before check to prevent cinders coming back in the blowpipes, unless there is hanging directly after the cast.

Reducing the blast temperature, say, from 1050 degrees Fahr. to 900 degrees or 800 degrees Fahr. will often loosen the furnace—that is, cause it to slip. However, it is not always desirable or possible to reduce the blast temperature, and the use of too much cold air, repeated too often, may result in off-grade iron.

If using a colder blast does not cause the furnace to slip, then the furnace must be checked. As a matter of fact, except after casting or in case a furnace is hanging stubbornly in the bottom, checking is resorted to more frequently than the use of cold air. The first check is almost never made sooner than 30 minutes after hanging develops, and then the furnace, if it is necessary to check repeatedly for some hours to keep it moving, is checked at not less than 40 or 60 minute intervals. Checking at 20 or 30 minute intervals almost invariably stiffens the furnace, and if it becomes necessary to check as frequently as this, it is a sign that emergency measures will soon be or are necessary.

Reducing the blast pressure at the tuyeres 3 to 6 pounds is usually effectual in slipping the furnace. If it does not slip, the blast is usually turned fully on for perhaps 20 minutes and then checked again, and a second or even a third check may follow in close succession, provided each preceding check does not slip the furnace; the second check is usually all that is necessary, although if hanging persists, a third check, the pressure being reduced 5 or 6 pounds, frequently becomes necessary, or the snort valve may be opened, thus taking the blast off altogether.

The degree to which checking is resorted to always depends upon the judgment of the furnaceman, as many furnaces and types of hanging require different treatment and amount of checking. When more than one check has been applied to the furnace the top and tuyeres are watched carefully to determine the instant the furnace slips, as it is essential to turn the blast on as quickly as possible to prevent jamming and packing of the material inside the furnace, thus making it stiff. This is especially essential when the snort valve has been opened.

When hanging and sticking prove so stubborn that even opening the snort valve will not cause the furnace to slip, about all that can be done is to resort to cold air at low volume. This usually causes the furnace to slip. Another option is to take the blast off suddenly by first notifying the engine-room force to stand by the engines, then signaling a check, and immediately throwing the snort valve open. This treatment, repeatedly applied at quick intervals has been known to cause the furnace to slip but is hard on blowing equipment.

A practice which is sometimes resorted to is to let the furnace stand with the gas drafted back. This method is seldom successful, the net result being apparently only to make the furnace tighter, and it is usually resorted to only when all other methods have failed. A better final method is to speed the engines up, push the blast pressure up to the limit, and thus break up the hanging column. This method and the use of cold air have been most successful, but the use of high blast pressure is sometimes prevented by weak stove shells, blast mains, blowing equipment, or furnace.

British Loose High Speed Steel Market

The Ironmonger, London, in a recent issue expresses concern regarding Great Britain's future market for high-speed steel. It is stated that in the last three years many countries have been forced to provide themselves with products formerly imported. In its editorial columns *The Ironmonger* comments on the situation as follows:

"Until the outbreak of war, Sheffield was doing a lucrative export trade to the United States, Germany, Japan, and other markets in high-speed steel and the more expensive varieties of carbon crucible steel. This has been practically extinguished by prohibition of exports, and the manufacturers concerned fear that the chances of its recovery are not very encouraging. Recent inquiries in the United States as to the position of the high-speed steel supply and the desirability of relaxing the regulations prohibiting export to that country have elicited the emphatic reply that the American engineers are now able to get all they need, which means that the Sheffield article is no longer indispensable to them. It is evident, therefore, that the American tool-steel makers have made considerable advances both in output and in the quality of their product, since the consumption is now much greater than at any previous time. Sheffield's German connection in the same kind of material has, of course, gone, and if the American trade suffers a like fate, the cutting off of these two valuable markets will represent a serious loss to our manufacturers. Our trade with Japan is affected in the same way. The development of Japanese engineering and shipbuilding brings with it a large and progressive consumption of best tool and other steels, which in the past have been supplied mainly from Britain, but such commodities are now produced in the country itself. Fortunately for our manufacturers, the Japanese steel of this class is not of really good quality, and the Japanese government still continues to employ the British product."

Senate Digs Into the Gun Problem

Military Affairs Committee Questions Progress Made in Arming—Crozier Discloses Delays in Ordnance Program—Present Situation Foreseen by Manufacturers Last Spring—Ministry of Munitions Suggested

ONCE more the ordnance problem has been shoved into the limelight. The senate committee on military affairs, inspired by a patriotic desire to speed-up the big game across the water, but not unmindful of the political benefits of unlimited newspaper attention, is delving into the complex activities of the war department. As might be expected in so vast a machine recently thrown violently into high gear, more than one screw has turned up loose.

General Crozier was first on the grill. He frankly confessed to disquieting shortages in machine guns, rifles, shells, grenades, etc.

Why the Browning Gun?

It was admitted in the hearings before the senate committee that although nine months have elapsed since war was declared, and of course a longer period since war was a certainty, the American troops have no machine guns except those of foreign manufacture, provided by our allies. The expeditionary force now in France is dependent upon the Chauchat type of light machine gun using American ammunition. The delay in securing machine guns seems clearly due to indecision with reference to the type to be adopted. Although $12,000,000 was appropriated by congress on Aug. 29, 1916 for machine guns, it was not until June, 1917, that the tests were completed and the Browning gun adopted These will not be delivered in quantity until April, 1918. For the million men called for in the program of the first year of the war about 80,000 machine guns will be needed. Tests of the Browning gun have been made by a joint army and navy board. None of these guns have yet been furnished for use in our training camps or abroad.

A similar condition exists in the case of rifles, although the first of the new Enfields were delivered in August. As in the case of the machine gun bickering among ordnance officers as to type consumed a great deal of time. Some line officers disapproved of the selection of the Enfield and its adaptation to the flangeless cartridge, but the latter point was justified by the necessity of having a cartridge interchangeable with the French with whom our men are to serve.

It is even less satisfactory, from the standpoint of the patriotic manufacturer, to learn that our rifle production has dropped amazingly in the past nine months. From 10,000 to 5000 a day are the figures named in the Crozier testimony. The general explained this rather vaguely by stating that many workmen drifted to other factories while the rifle change was being worked out.

Where Lies the Blame?

SENATOR HITCHCOCK—Is it not true that all these factories in the United States today and the arsenals and armories are only manufacturing half as many rifles a day as they were last March?

GEN. CROZIER.—That is not quite true.

SENATOR HITCHCOCK.—You stated that they were manufacturing 10,000 a day then. I understand that they are only manufacturing 5000 a day now—nine months later.

Here Gen. Crozier explained that many workmen had gone to other factories while the rifle change was being worked out.

SENATOR WEEKS.—Has there not been gross neglect on the part of some, in that those organizations should have been allowed to dissolve?

GEN. CROZIER.—That would have necessitated keeping a very considerable number of men on the payrolls, with nothing to do, and would have required some one to have paid out money for it. We did that to a certain extent, and we have been very severely criticized for it.

As a matter of fact this situation was plainly foreseen by the manufacturers concerned nearly a year ago, and its dangers were clearly pointed out at that time. In its issue of March 29, 1916, THE IRON TRADE REVIEW said:

"Current events lead almost inevitably to the conclusion that the production of shells for our own use must be multiplied indefinitely. Yet the means of production are being allowed to slip from our grasp as shops are being dismantled, their equipment sold and their organizations scattered. The allies have bequeathed us a priceless heritage—a completely organized munitions industry. What use are we going to make of it?"

As late as July, it now appears, this last question was still being bandied about the corridors of the war department.

The inevitable disorganization of industry that followed this inaction is now offered as an explanation for the shortage of munitions.

By the discerning, however, it cannot be accepted as an excuse.

Are Our Specifications Right?

Aside from the Crozier investigation, other shreds of evidence recently have appeared to show that all is not well in the ordnance department. Ordnance appropriations of 1916 had not been expended at the time of our declaration of war. Congress placed an emergency fund of $100,000,000 at the disposal of the President in March. He turned a liberal proportion of it over to the war department, but our purchasers of ordnance stores, so it appears; were a lap and a half behind and none of this fund was drawn upon until August of this year.

From an inside source it is reported that steel shells of the larger sizes for the American army are being finished without a final heat treatment, contrary to French practice for similar shells. The British shells made in this country were seldom heat treated, but they were of heavier section.

The American shell steel specifications published in THE IRON TRADE REVIEW, Dec. 6, state that the test bars which govern the acceptability of the steel shall be heated prior to breaking in the tensile machine to between 775 and 875 degrees Cent., quenched in water at 15 to 35 degrees and then reheated for 30 minutes at 500 to 550 degrees. The French specifications allow a spread of only 20 degrees in the temperature limits on first heating, with no variation in water temperature and only 25 degrees on reheating.

Are our specifications properly drawn? One French ordnance expert now in this country has stated that our test-bar heat-treatment clause is so loosely constructed that he could take any piece of scrap steel found in an open-hearth stock yard and by manipulating the heat treatment within the limits permitted by our specifications produce a piece that would pass the required tests!

American steel manufacturers are not seeking such free and easy working conditions. Rather they would see evidence of a keener regard in

Washington for the war-proved experience of our allies—experience which might save the lives of our artillerymen.

A Ministry of Munitions

Looking at the problem generally in the light of the developments of the past week, what is needed most are constructive suggestions. Unless they are forthcoming, the avalanche of investigations, charges and countercharges in which we are now enveloped will be worse than useless. Furermore, to excoriate individuals serves no purpose when the system is at fault.

It would seem that what is needed in this country is a ministry of munitions, organized possibly on the British plan, and charged with the responsibility of keeping our armies fully supplied. This would relieve the war department of a burden of tremendous proportions and would concentrate responsibility and authority. As has been frequently pointed out in the past both here and abroad, the production of war munitions is essentially a manufacturing problem. Is it not reasonable to suppose, therefore, that it could be handled better by men skilled in manufacturing than by military experts, however highly trained they may be in ballistics and the technic of the proving ground? Building guns is a different problem from fighting them.

Gas for Munitions

Domestic Consumption Must be Curtailed to Expedite Production

Pittsburgh, Dec. 18.—Why natural gas conservation must be practiced by domestic consumers in extremely cold weather, was explained to the Pittsburgh chamber of commerce a short time ago by David O. Holbrook in an address on "The Natural Gas Situation in Reference to Munition Work". Mr. Holbrook is a member of the natural gas committee of the council of national defense. "The heat power of natural gas consumed annually in the United States," he said, "is equivalent to 600,000 cars or 30,000,000 tons of coal, and my investigations have led me to believe that the day of industrial natural gas for continuous service is past. Domestic consumption is increased 3 per cent with each drop of one degree in temperature below freezing so that zero weather consumption is twice that of freezing. Pipe-line transportation is the neck of the bottle and there is sufficient gas to heat every home in Pittsburgh, but it is not available when needed, as it cannot be stored.

Supreme Court Criticized

Gompers Displays Customary Contempt of Law When Labor is Ordered to Keep Within Bounds

In criticizing the recent decision of the United States Supreme Court upholding the right of employers to avail themselves of the open shop principle and to prevent conspiracies to bring nonunion employes into labor organizations, Samuel Gompers, president of the American Federation of Labor, uses the adjectives "far-reaching" and "unwarrantable". The Hitchman Coal & Coke Co., and the Eagle Glass Mfg. Co., of West Virginia, were by the Supreme Court's decision permitted to run open shops and injunctions restraining the United Mine Workers and the Flint Glass Makers' union from efforts to organize their employes were upheld.

Extracts of the opinion set forth follow: "The Supreme Court holds that the plaintiff was acting within its lawful rights in employing its men upon the terms that they should not become members of the United Mine Workers; that, having established this working agreement between it and its employes with the free assent of the latter, the plaintiff is entitled to protection in the enjoyment of the resulting status; that the fact that the employment was terminable by either party at any time made no difference, since the right of the employes to strike or leave the work gave no right to defendants to instigate a strike or disorder of a similar nature.

"By way of justification or excuse, defendants set up the right of workmen to form unions and enlarge their membership by inviting other workingmen to join. The opinion of the court freely concedes this right, provided the object of the union be proper, which is assumed to be true in a general sense, with respect to the United Mine Workers of America. But, it is erroneous to assume that this right is so absolute that it may be exercised under any circumstances and without qualification; it must always be exercised with reasonable regard for the conflicting rights of others.

No Labor Conscription

In his annual report to congress recently, Secretary of Labor Wilson, discussing various phases of the labor situation, stated he did not believe conscription of labor would be necessary to win the war. With that as a possibility, however, he believed that the government should at the same time conscript the industries in which such labor is engaged, so that when workers were conscripted for industrial purposes, they would not be coerced servants of employers but employes directly in the service of the government itself.

Record Wages Paid

A high record in monthly wage disbursement was made in November in Youngstown, O., when $6,239,803 brought the total wages paid for the first 11 months of 1917 up to $58,806,880. Despite plant suspensions at various times this is $18,506,880 in excess of the same period in 1916. Each year has increased the amount of wages paid and it is confidently expected that 1917's aggregate will be more than three times as much as 1911's, which was $20,748,216.

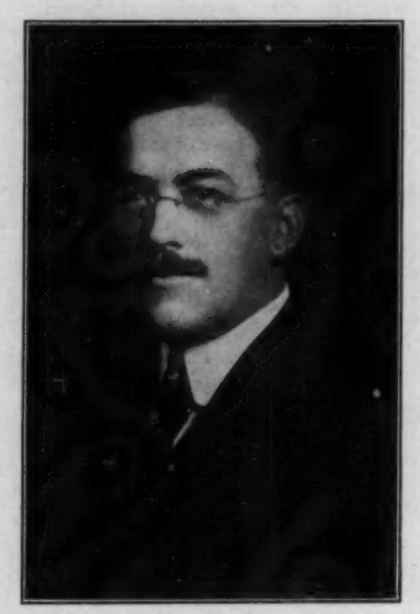
Wage increases made for the month of October, 1917, were greater in the iron and steel trades than in any other industry, according to the report of the department of labor, Washington. Sixty-one out of 110 establishments reported increases and the total payrolls for the month were 49.2 per cent greater than those of October, 1916. That the war has caused a greatly increased employment is demonstrated by the fact that iron and steel trade employes increased 11.4 per cent in the year.

Western Troubles Trivial

The Industrial Commission of Colorado finds that the grievances presented to the Colorado Fuel & Iron Co., Denver, by the United Mine Workers of America, representing employes of that company, were nearly all unimportant and more or less trivial, permitting of prompt adjustment between employes and employer through the industrial plan adopted by the Colorado Fuel & Iron Co. J. F. Welborn, president of the company, in a circular letter dated Dec. 1, sent to all employes, states that the award of the commission for an increase of 6 cents per ton in the scale for hand mining at Fremont, Rockvale and Coal Creek mines in the Canon district has been put into effect. He also says the company will continue to adjust any grievances through the industrial representation plan as in the past.

Obituaries

JOHN LOCKE HAINES, assistant to Willis L. King, vice president of the Jones & Laughlin Steel Co., and a director of the company, died Dec. 14 at his home in Pittsburgh, after an illness beginning in May. He was 51 years of age. Mr. Haines was widely known in the steel industry and was a member of the American Iron and Steel institute. He returned recently with Mrs. Haines from Massachusetts, where he had gone in an effort to recover his health.



JOHN L. HAINES

Mr. Haines was born in Saco, Me., May 16, 1866, and was the son of Moses J. and Hannah Clark Haines. Receiving his early education in the public schools of Portland, Me., at at the age of 21 he entered the employ of the Tepperell Mfg. Co. Biddiford, Me., manufacturer of cotton goods. Seven years later he went to Boston and was employed for three years by Wallace R. Morse & Co., commission merchants. Mr. Haines came to Pittsburgh in 1897 and immediately became connected with the Jones & Laughlin Steel Co. He was employed in the structural sales department, and after two years, was put in charge of the order department. He was appointed to the position of assistant to the vice president Jan. 1, 1910. Mr. Haines was a member of the Hyland Avenue Presbyterian church, the Duquesne and Union clubs, Pittsburgh, the Pittsburgh Athletic association, the Engineers' Society of Western Pennsylvania and the chamber of commerce of his home city. He is survived by his widow and one sister.

Chester T. Foote, formerly of the C. Foote Mfg. Co., Nunda, N. Y., died recently.

Elijah Raglan Cabble, age 62, formerly of the William Cabble Excelsior Wire Mfg. Co., Brooklyn, died Dec. 12 at his home in that city.

Miss Charlotte Blair, who organized the American Cast Iron Pipe Co., Acipco, Ala., and who was secretary of the company for a number of years, died Dec. 9, in Atlanta, Ga.

Thomas Mooney, president of the Acorn Engineering Co., age 70, who for 47 years served as designing engineer at the John Roach shipyard, died at his home, Dec. 11, in Douglaston, L. I.

Dr. Samuel M. Moore, age 47, died Dec. 12 at Evanston, Ill. He was a son-in-law of the late Chief Justice Melville E. Fuller and from 1903 to 1914 was chief surgeon for the Illinois Steel Co.

Francis W. Heisler, 61, died Dec. 4, at Wilmington, Del. He was one of the iron industry's pioneers, retiring from an important executive position with the Edge Moor Iron Co., a few years ago.

Morgan James, born in Johnstown, Pa., in 1868, died Dec. 7, at Lorain, O. Prior to locating in that city he was employed in the steel mills of Johnstown and Braddock, Pa., until he accepted a position with the Johnson Steel Co., Lorain, in 1893, which later became the National Tube Co. At the time of his death Mr. James was master mechanic in the plant of the National Tube Co.

David Stephen Mathias, consulting engineer, South Works, Illinois Steel Co., Chicago, born at Rhumney, Wales, Jan. 6, 1844, died of heart failure at his home on Dec. 5. In 1857, with his parents, he settled in the Pittsburgh mill district, and soon commenced to work in the iron mills. From 1860 to 1863, he was affiliated with the Indianapolis Rolling Mill Co., Indianapolis, and the four years following he was employed by the Union Rolling Mill Co., Chicago. Subsequently, he was employed as superintendent in the following plants: Hamilton Rolling Mill Co., Hamilton, Ont.; Superior Rolling Mill Co., Allegheny, Pa.; Kansas Rolling Mill Co., Rosedale, Kans. For three years prior to 1888 he was superintendent of the South Chicago rail mill, then controlled by the North Chicago Rolling Mill Co.; later he was made superintendent of the entire South Chicago plant. Practically his entire life was spent in the rolling branch of the steel industry and he is accredited with many rolling-mill inventions. In 1891 he retired from the general superintendency and was made a life member of the consulting superintendent's staff. His innate love for the mills brought him to the plant daily. His three sons are graduates from the South works. David R. Mathias is now general superintendent of the Joliet works; William G. Mathias is general superintendent of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala.; and Thomas H. Mathias is assistant general superintendent of the plant of the Lackawanna Steel Co., Buffalo. In addition to the three sons, the following survive him: His widow, two daughters, three sisters and a brother. He was known as the grand old man of the South Chicago mills, and some declare an appropriate title for him would have been "Father of the Mills".

DAVID S. MATHIAS

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

J. C. BANNISTER, formerly manager of the Kewanee, Ill., works of the Walworth Mfg. Co., Boston, has been made vice president of the company with headquarters at Kewanee for the present. Mr. Bannister has been connected with the manufacture of iron pipe fittings, valves, etc., for 26 years, starting in 1891 as foreman of the tapping department of the Haxtun Steam Heater Co., Kewanee. Several promotions brought him to the position of superintendent of the pipe finishing mill and chief engineer. He was then for three years superintendent of the Kewanee Boiler Co., and when the National Tube Co. took over the operation of the Kewanee plant, he was made manager, retaining that position after it was purchased by the Walworth Mfg. Co.

R. C. Leitelt has been re-elected president of the Leitelt Iron Works, Grand Rapids, Mich.

Allan C. Chambers has been made assistant sales manager of the Russel Axle Co., Detroit.

William F. Bailey, assistant to the president, Midvale Steel & Ordnance Co., Philadelphia, has resigned.

John Kelsey, president of the Kelsey Wheel Co., Detroit, was recently elected a director of the Security Trust Co., of that city.

George P. Sweet, general manager of the United Motors Co., Grand Rapids, Mich., has volunteered for service in the motor truck division of the United States army.

G. W. Pratt affiliated with the sales force of the Midvale Steel & Ordnance Co. at Toledo, has been transferred to that company's Cleveland office.

Arthur T. Malm, research engineer for the Norton Co., Worcester, Mass., has returned from a three-months business and pleasure trip to Japan.

A. H. Sarver, formerly affiliated with the Buick Motor Co., Detroit, has been elected president and director of the Scripps-Booth Corp., Detroit, to succeed Clarence H. Booth, resigned.

L. B. Schofer has been elected director of the Reading Car Wheel Co., Reading, Pa., to take the place of L. L. Trowbridge, deceased. J. B. Bowers has been appointed to the latter's position as superintendent.

J. H. Plummer, a director of the Dominion Steel Corp., Sydney, N. S., has been made a member of the advisory committee for Canada which will promote that country's industrial development.

E. C. Sickles, formerly works engineer of the Hyatt Roller Bearing Co., Newark, N. J., is now affiliated with the Lackawanna Bridge Co., in its shipbuilding activities at Port Newark, N. J.

George A. Rees has accepted the position of general purchasing agent of the Chicago Pneumatic Tool Co., Chicago. He succeeds R. S. Baker, whose duties as auditor require his entire time.

L. S. Love has resigned as sales manager of Sherritt & Stoer Co., Philadelphia, to become general manager of the Machine Tool Engineering Co., Singer building, New York City.

Charles L. Allen, treasurer and general manager of the Norton Co., Worcester, Mass., has returned from a three-months trip to Japan, where his company is considering opening up branches in several of the larger cities.

H. H. Timmerman has been made secretary of the Beckemeyer Foundry Co., Beckemeyer, Mo., which will specialize in mine cars and wheel work. E. T. Williams is foundry superintendent.

Ralph P. Zint, formerly affiliated with the Federal Export Corp. and the Commercial Iron & Steel Corp., New York, has accepted the position of manager of the steel department of the Swiftsure Export Corp., 120 Broadway, New York.

J. Elmer Pratt, president of the Highgrade Motors Co., Harbor Springs, Mich., announces the election of Lette Shay, George Stone and L. W. Soppock as vice president, assistant treasurer and assistant secretary respectively.

W. H. Oliver, formerly Philadelphia district sales manager for the Republic Iron & Steel Co., has been placed in charge of the branch sales office recently opened by this company in the Munsey building, Washington.

Stanley P. Stewart, formerly mechanical engineer of the Stewart Boiler Works, Worcester, Mass., has been appointed assistant to Superintendent Thomas of the machinery division of the American International Shipbuilding Corp., Philadelphia.

Charles H. Sparrell, secretary of the mercantile bureau of the chamber of commerce, Worcester, Mass., has resigned to accept the position of purchasing agent and traffic manager of the Spencer Wire Co., Worcester, Jan. 1.

H. J. Moore, formerly assistant master mechanic, Central furnace, American Steel & Wire Co., Cleveland, has been appointed superintendent of high tension power lines between the Central works and the Newburg Steel works.

G. A. Schneider, formerly affiliated with the sales organization of the Western Electric Co., San Francisco, has been appointed Buffalo manager for the company to succeed J. W. Tabb, who has been transferred to the New York office.

Charles C. Lewis, formerly connected with the Ford Motor Co., has accepted the position of purchasing agent for the Perlman Rim Co., Jackson, Mich.

A. Y. Gowan, Cleveland, has purchased the interests of Earle Welborn, president, and Henry B. Joy, of the Packard Motor Car Co., in Isko, Inc., Detroit, manufacturer of electrical refrigerating units.

Horace E. Thomas, formerly chief engineer of the Reo Motor Co., Lansing, Mich., has been made chairman of the designing committee, perfecting the war department's three-quarter and one-ton war trucks.

Julian McGar, recently affiliated with the engineering force of the New Departure Mfg. Co., Bristol, Conn., has left with the twenty-third division of construction engineers of the United States army.

Storm Conditions

Render Car and Coal Shortages More Acute With Refractory Makers

Pittsburgh, Dec. 18.—Embargoes are a source of much annoyance to the refractories industry. Shipments can be made from plants only through special permits. Consumers are urging deliveries but preference is given to those who are engaged on war work. Shortage of coal also continues to curtail operations and the situation was made worse as the result of the recent blizzard.

Makers are well sold up and are unable to take new business where considerable tonnages are involved. Prices remain unchanged. First quality Pennsylvania brick commands $45 to $55. First quality Pennsylvania and Kentucky fire clay brick continues to command from $45 to $55, while this grade of Missouri-Illinois brick is cut from $55 to $65, on Ohio brick at $45 to $50 and New England brick $55 to $65, all per thousand f.o.b.

Ohio makers of refractories are experiencing more than their share of difficulties owing to inadequate transportation facilities. Unless some immediate relief is given, one maker announces that it will be necessary for him to curtail production entirely. At the present time his plant is operating at half capacity. During the past week only three cars were received at the plant out of a total of 70 cars ordered. The receipt of only 4 per cent of the cars ordered has meant that the company has been obliged to stack still more brick in addition to curtailing its production. If cars are not supplied at a greater rate than during the past two months, fully five months will be required to move the bricks stacked. A price change in second quality Ohio fire brick has been made quotations now being $35; first quality continues at $45 to $50.

Refractories

(Per 1000 f. o. b. works.)

FIRE CLAY BRICK.
(First Quality.)

Pennsylvania	$45.00 to 55.00
Missouri-Illinois	55.00 to 65.00
Ohio	45.00 to 50.00
Kentucky	45.00 to 55.00
New England	55.00 to 65.00

FIRE CLAY BRICK.
(Second Quality.)

Pennsylvania	$40.00 to 50.00
Ohio	35.00
New England	48.00 to 58.00

SILICA BRICK.

Pennsylvania	$50.00 to 60.00
Chicago	55.50 to 65.50
Birmingham	45.00 to 55.00

MAGNESIA BRICK.
(Per Net Ton.)

9 x 4½ x 2½	$135.00 to 160.00

CHROME BRICK.
(Per Net Ton.)

9 x 4½ x 2½	$135.00 to 140.00

BAUXITE BRICK.
(Per Net Ton.)

55 per cent	$40.00 base
76 per cent	100.00 base

Largest Service Flag

The largest service flag displayed in this country from the viewpoint of size and the number of men represented, was strung across Broadway recently by the United States Steel Corp. The flag indicates that 11,490 employes of the Corporation are in the military or naval service of the nation. The number of men is shown on the flag, which is 34 feet wide and 54 feet long, by huge figures formed of double rows of blue stars. Each figure is six feet long. Of the 37 different subsidiaries of the Corporation which contributed to the total enrollment, the Carnegie Steel Co. headed the list was 1984. Among other companies contributing large totals are the American Steel & Wire Co., 1738; American Sheet & Tin Plate Co., 1417; National Tube Co., 1078; Illinois Steel Co., 1003; Tennessee Coal, Iron & Railroad Co., 911; Oliver Iron Mining Co., 698; and the American Bridge Co., 577.

Steel Plant for Holland

Consul Frank W. Mahin at Amsterdam reports that plans for the building of a blast furnace, steel plant and rolling mill after the war are now well under way at Ymuiden, Holland. Because the ore to be used would be imported from foreign countries, the plant will be built on a waterway navigable for large ships, such as the entrance of the North Sea canal at Ymuiden. Most of the capital stock of 25,000,000 florins ($10,050,000) has been subscribed and it is expected the government will not only take a part of it but will render strong support in other ways. The products of the works are intended primarily for shipbuilding. Bridge building industries, boiler works, etc., will be supplied. The committee in charge of preliminary arrangements includes the following: C. J. K. van Aalst, president, the Netherlands Trading Co., and the Netherlands Oversea Trust; H. Colyn, director of the Bataafsche Petroleum Co.; F. H. Fentener van Vlissingen Jr., director of the Coal Trading association, with other representatives of important industries.

Benzol Market

Is Active and Stocks are Reduced—Other Products Quiet

New York, Dec. 15.—Exceptionally heavy buying of benzol has resulted in greatly reducing the large stocks which had accumulated. The larger portion of this business, which involved millions of gallons, was involved in contract renewals for 1918. The prices on the large contracts ranged from 39 to 41 cents per gallon at producer's plant on the average, although the very largest business was done at still lower figures. Large spot sales were made at the same prices, while a heavy business in carloads and drums was done at 42 to 45 cents for spot shipment. All of this business, with the exception of a trifling quantity, was booked for domestic consumption. Hundreds of thousands of gallons are involved in inquiries still pending.

Other coal tar products are fairly quiet. No further government orders for toluol were distributed this week. Phenol inquiry is brisk, but the sold-up condition of the market prevents the booking of much business. Several moderate-sized sales of spot phenol went at 52 cents per pound at producer's plant. Sales of solvent naphtha appear to have totaled about 150,000 gallons, which went at 19 to 22 cents per gallon at producer's plant, depending on the quantity. Business in sulphate of ammonia continues to be comprised entirely of small spot lots, which are going at $4.90 to $5 per 100 pounds at seaboard. The coal tar products continue to suffer from railroad embargoes.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant

Pure benzol	$0.39 to .41
Toluol (nominal)	1.70 to 1.80
Solvent naphtha	.19 to .22

Per Pound at Producers Plant.

Phenol	$0.52

Per 100 Pounds at Seaboard

Sulphate of ammonia	$4.90 to 5.00

Contract

Per Gallon at Producers Plant

Pure benzol	$0.39 to .41
Toluol	nominal
Solvent naphtha	.19 to .22

Per Pound at Producers Plant

Phenol (nominal)	$0.52

Per 100 Pounds at Seaboard

Sulphate of ammonia	nominal

An addition is being built by Stanley G. Flagg & Co., Pottstown, Pa., to building No. 16.

Trade Bodies to Handle Imports

Associations Such as Iron and Steel Institute Appointed Government Agents—No Power Over Licenses—Labor Supply to be Controlled by Industrial Service Section of War Board

WASHINGTON, Dec. 18.—Trade associations such as the American Iron and Steel institute are to be made government agents for handling commodities imported from foreign countries and controlled by the war trade board under the proclamation of the President issued Nov. 28. The institute and seven other similar organizations have already been appointed to their work and have won the praise that "their offers to aid and their spirit of co-operation is of the highest value to the government in its efforts to bring about and maintain the high standard of military and commercial efficiency necessary for the winning of the war."

The institute is to handle all importations of tin, chloride of tin and tin ore. The Oils and Oil Seeds Association of America is to manage palm oil and palm kernel oil importations. Other organizations and the commodities they are to handle are: Rubber Association of America, raw or reclaimed rubber also waste or scrap, balata, gutta joolatong, gutta percha and gutta siak; Textile Alliance, wool and animal hair, wooled and haired skins, jute and burlap, including bags, cotton, flax, and mica; United States Shellac Importers Association, shellac; Tanners Council of the United States of America, leather, hides and skins, and tanning materials; American Diamond Committee, rough diamonds; and the Plumbago-Graphite Association, plumbago.

No Control Over Licenses

The war trade board's announcement of the affiliation of the Iron and Steel institute and the other associations in co-operating in handling importations, said:

"The various trades and industries dealing in certain of the controlled commodities have been so organized that their full requirements may be accurately surveyed, nonessential uses of any material eliminated, and a system of control provided by the war trade board, which will insure the equitable distribution of the imported commodity and its consumption in the most essential products. Under the present arrangement, the control formerly exercised by foreign governments over these commodities on reaching our shores, will now be assumed by the United States government with the assistance of these trade committees.

"These committees are not given any authority whatsoever in the granting or refusing of import licenses, or in any way on their own initiative to determine who shall or shall not import these commodities or determine their disposition; but their only functions are to gather such information in the various trades as the government, acting through the war trade board, may from time to time direct, to act as consignees of the various commodities as directed; to release these commodities to the importers under instructions from the war trade board and prior to such release to obtain from the importers such guarantees or other agreements as the war trade board may require; to keep themselves informed for the benefit of the board as to the use and disposition of the imported commidities, and the observance by the importers of any guarantees of agreements given in connection therewith, and to keep full and complete records of all importations of the various commodities."

Articles Controlled

The articles controlled by the presidential proclamation are: Antimony, antimony or any chemical extracts; asbestos; beans; castor seed and oil; chrome, chrome ore, and alloy or chemical extracts; cocoanut oil; cobalt, cobalt ore and alloy or chemical extracts; copra; all ferroalloys; hemp; iridium; manganese, manganese ore and alloy or chemical extract; molybdenum, molybdenum ore and alloy or chemical extract; naxos emery or naxos emery ore; nickel, nickel ore, matte and alloy or chemical extract; sodium, potasium or calcium nitrates; optical glass; platinum; pyrites; rice; scheelite; sisal; soya bean oil; spiegeleisen; sugars; titanium, titanium ore, and alloy or chemical extract; tobacco; tungsten, tungsten ore, alloy or chemical extract; vanadium, vanadium ore, alloy or chemical extract; wheat and flour; and wolframite.

To Control Labor Supply

Washington, Dec. 18.—More effective distribution of the labor supply of the United States is the purpose of the creation by the department of labor of an industrial service section under the war industries board. L. C. Marshall, formerly instructor in the commercial school of the University of Chicago, has been made chief of the division and he had already begun the task of co-ordinating the labor bureaus and exchanges throughout the country with a view to transferring, surplus labor to plants, industries and localities where shortages exist.

The bureau will work directly with the division of industrial resources, under George N. Peek; the commercial economy board, of which A. W. Shaw is chairman; the state councils of defense; the United States employment service and its 94 exchanges; the public service reserve; the boys' working reserve; labor unions; and the 118 state and municipal employment agencies of the country.

Through the industrial resources division Mr. Marshall expects to keep close tab on labor released as fast as the industries affected adjust themselves to more essential war production. When the readjustment requires more labor he then will seek to supply the demand. If the work of the commercial economies board has similar results, the same labor adjustment will apply. The difference between the industrial resources division and the economy board is that in the resources bureau, adjustment of plants from one line of production to another is to be advised and supervised and in the other the stopping of waste in a particular industry is urged. Of course, Mr. Marshall will co-operate with the committees of the labor section of the war industries board.

Bureau is Constructive

Washington, Dec. 18.—The first annual report of Burwell S. Cutler, president of the Cutler Desk Co., Buffalo, now chief of the bureau of foreign and domestic commerce, points out the value of the bureau to manufacturers and merchants as an aid in developing foreign commerce. He goes into detail on statistics, especially showing the growth of foreign trade since 1913, the year before the war, but regarding the bureau itself he says:

"As a practical manufacturer and exporter, I entertained to a mild extent an instinctive skepticism regarding the efficiency in organization and productive capacity of a govern-

ment bureau as compared with the highly organized forces characteristic of large private enterprises, for this is a feeling all too common among business men. I find that a misapprehension of the value of the bureau is based on a typical ignorance of the bureau's current activities. Please let me emphasize the conviction that the bureau is a genuinely producing agency, well organized and calculated to assist our manufacturers and merchants in useful ways.

George H. Scidmore, consul general at Yokohama, reports that the capacity of Japan's steel mills at the end of August was 888,000 tons. Mills of five companies in the first half of 1917 produced 258,000 of the 289,000 tons of shapes rolled. At this rate, it is expected the annual production will be at least 570,000 tons net.

War Industries Committee is Organized

WASHINGTON, Dec. 18.—Co-operative machinery of representatives of American industries, which was wrecked with the enactment of the food control bill with its drastic Section 3, was set up again last week when chairmen and representatives of war-service committees of various lines of business organized the war-industries committee of the chamber of commerce of the United States and agreed to affiliate with it. This is the direct result of the famous war business convention of the chamber held at Atlantic City late last summer, called when the effect of the food bill was seen in wholesale resignations of members of the subcommittees of the council of national defense.

The principle involved in the operation of these committees on inquiries or orders of the government and the allies is similar to that employed by the American Iron and Steel institute in its dealings with the steel trade and the government. These new war-service committees will receive the inquiries and advise the government's communicating officer. Allotment of orders will be made through the committees. They will serve as clearing houses and advise the government of plant capacities and the availability of certain industries to handle work.

In this connection, the committees will work probably chiefly with George N. Peek, chief of the industrial resources division of the war industries board. Mr. Peek is anxious to know just what industries and what plants or parts of plants can be converted for production essential to supplying war needs, but rather than have each individual manufacturer come to Washington and tell him, he wants communications centered through the war service committee of the industry of which the manufacturer is a part. This principle is to be followed in dealings of other government officers, those who attended the conference last week were told.

Waddill Catchings, president of the Sloss-Sheffield Steel & Iron Co., is chairman of the central committee of the chamber, the committee which formerly was known as the committee on co-operation with the council of national defense. With Mr. Catchings on the committee are Homer L. Ferguson, president, Newport News Drydock & Shipbuilding Co.; William Butterworth, president, Deere & Co., Moline, Ill., of which Mr. Peek is vice president; Harry A. Wheeler, vice president, Union Trust Co., Chicago; Lewis E. Pierson, chairman, Irving National Bank, New York; Charles Nagel, attorney, St. Louis; and John H. Fahey, newspaper publisher, Boston.

Under the plan adopted, trades having representative organizations are asked to affiliate them with Mr. Catchings' committee. Where there is no representative body, the trade is urged to form one. Mr. Catchings' committee has been authorized to increase its size or form an advisory board to co-operate with it. The central body will keep after the trades until they have some sort of representation. Announcements will be made later of the committees with which the government can deal.

The following representatives of trades closely allied to the iron and steel industry were among the 150 who registered at the conference:

N. M. Nones, New York, representing manufacturers of ball bearings; E. E. McNair, Detroit, United States Radiator Corp.; Frederick W. Hevendeen and William B. Reed, New York, Cast Iron Boiler & Radiator Manufacturers of United States; George S. Barnum, American Boiler Manufacturers Association; A. A. Bernartz, Chicago, Federal Brass Works; Charles F. Lang, Cleveland, President, Lakewood Engineering Co.; Harry L. Grant, Chicago, Western Electric Co.; C. Loomis Allen, and R. H. Gadsden, American Electric Railway association; A. A. Fisher, Motor and Accessories Manufacturers; Walter J. Kohler, Pittsburgh, Porcelain Enameled Sanitary Ware Manufacturers association; Horace Bowker, Chemical Alliance; Jay Crissey, Interstate Furniture Manufacturers association; John W. Lieb, National Committee on Gas and Electric Service; C. A. Graves, Empire State Gas and Electric association; F. C. Ball, Muncie, Ind., Ball Bros. Brass Manufacturers Co.; J. H. Clancy and R. A. Bull, American Foundrymen's association, Cleveland; John A. Bowman, Columbus, O., John W. Brown Mfg. Co.; S. T. Henry, New York, Allied Machinery Corp.; Burton S. Gier, Cleveland, Pressed Metal association; H. H. Hamilton, Bridgeport, Conn., Hamilton & DeFoss, Inc.; C. K. Cohn, Columbus, O., Columbus Auto Parts Co.; Sidney Detmers, New York, Association of Sheet Metal Ware Manufacturers; D. G. Bugg, John H. True and Charles Frankel, New York, Store Equipment Manufacturers association; C. H. Flinterman, Detroit, Pressed Metal association; A. C. Bedford, Washington, chairman, petroleum committee, council of national defense; William H. Fehsenfeld, Cleveland, National Petroleum association; James E. Bennet, and E. J. Ottayer, New York, Printing Press Manufacturers association; W. F. M. Goss, New York, Railway Car Manufacturers association; W. A. Blandin, Cleveland, National Fixtures Manufacturers association; H. F. Thunhorst, New York, American Specialty Manufacturers association; John Sterling Deane and Lewis D. Rights, representing steel fabricators; Robert A. Patton, Hoosic Falls, N. Y., National Association of Stove Manufacturers; Fred Will, Columbus, O., National Warm Air Heating association; J. B. Doan, Worcester, Mass., National Machine Tool Builders association; Raymond Marsh and Samuel T. White, Chicago, American Washing Machine Manufacturers association; Frederick K. Copeland, New York, Compressed Air society; J. W. Gardner, Battle Creek, Mich., Hydraulic society; A. Cressy Morrison, New York, International Acetylene association; H. H. DeToir, Bridgeport, Conn., Handy & Harmon; M. Wetzstein, Cincinnati, Automatic Concrete Stone Machine industry; George A. Schwer, Sandusky, O., The Dauch Mfg. Co.; Wm. H. Graham, Chicago, National Association of Chair Manufacturers; D. A. Monroe, Pittsburgh, Pittsburgh Motor Co.; Charles Pfau, Chicago, Carbon club; George D. McIllvaine, Pittsburgh, National Pipe and Supplies association; Zenas W. Carter, Cleveland, Associated Metal Lath Manufacturers; Charles S. Brantingham, Rockford, Ill., National Implement and Vehicle association; D. C. Sheahan, St. Louis, Associated Cooperage industries; H. G. Heidt, National Gas Engine association; H. L. Green, Cleveland, Pressed Metal association; Clarence L. Collins, Electric Power club; W. Chadwick, Davenport, Ia., Davenport Locomotive Works; J. C. Johnson, Davenport, Iowa, Associated Manufacturers, and P. P. Beck, Bettendorf, Iowa, The Bettendorf Co.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Commissioner Roper Reviews Tax Law

AT LAST some one has taken up cudgels in defense of the war revenue act. Commissioner of Internal Revenue Daniel C. Roper, in an address before the conference of the government with representatives of trade papers at Washington last week made his first public utterance of his views on this important law. As Mr. Roper heads the work of interpreting and applying the act, his opinions are being received with considerable interest.

"Some persons have undertaken to criticise the law and point out its crudeness and inequalities," he said. "Imperfections in the law are not to be wondered at when it is remembered that so many of its provisions invade virgin territory. A careful study of the act, however, will convince the unbiased student that it is a remarkable piece of legislation, requiring only an intelligent and sympathetic attitude on the part alike of administrative officials, the congress and the people to bring it into workable form and to accomplish its purpose without destroying business or visiting undue hardship upon taxpayers who properly co-operate in its administration. But to accomplish these desirable ends the sympathetic and patriotic co-operation of the congress, the administrative officials and taxpayers are each and all indispensable. If they are assured there need be no undue anxiety. A good law may be ruined by reckless methods of administration, and a defective law vastly improved by intelligent and painstaking administration. Considerations of this nature prompted the secretary of the treasury soon after the passage of the law to call to my assistance in interpreting the excess profits provisions of the law nine able and representative American business men. For several weeks these men have devoted their entire time without compensation to hearing and studying the views of taxpayers regarding the excess profits law to the end that they may be able to give to the commissioner of internal revenue information as to business based upon fresh and up-to-date knowledge. The end sought is to collect the tax which the law imposes with the least possible hardship and inequality. These excess profits advisers have brought to the assistance of the bureau of internal revenue a dependable knowledge of the viewpoint of the taxpayer and of business conditions which is essential to the practical solution of the problems with which we are confronted.

"This I believe to be the first time that any government department has worked out a co-operative plan for ascertaining and digesting the business and industrial conditions affected by federal law. It is a step toward that understanding that should prevail in every democracy between the people and those whose duty it is to administer the law. In furtherance of the desire of the department to solve its problems in the light of actual conditions rather than of superficial considerations, there has been called to its assistance a group of legal advisers composed of representative lawyers of very broad experience, who are patriotically giving without cost to the government assistance that we could not purchase in interpreting the law.

Said to Publish Rules

"Following the publication soon to be made of the rules and regulations for the administration of the law is to come the tremendous task of actually collecting the taxes. The period between Jan. 1 and March 1 is fixed by law for the filing of returns by the taxpayers. Payment must be made before June 15. The campaign of administration involves a campaign of education. It is intended that every available avenue shall be utilized for informing taxpayers as to the amount of tax for which they are liable and how, when and where their taxes are to be paid. To this end the field force of the bureau is to be expanded and reorganized and specially charged with the duty of coming into personal contact, between Jan. 1 and March 1, as nearly as possible with every person subject to the tax.

"Schools of instruction are to be held in every collection district and early in the new year a competent revenue official will be sent into every county in the United States. These agents will be provided with all necessary forms and will be qualified to render assistance to taxpayers in making out their returns. Public announcement will be made through the press of the dates when these men will visit each community and taxpayers will be urged to call on them promptly. Their services are free and there should be no necessity for anyone to incur expense in the preparation of his return.

"Plans have also been perfected whereby the revenue field officers are to have the co-operative aid of the state and county councils of national defense not only in disseminating information regarding the law, but in arousing and stimulating a patriotic attitude toward war taxation. Volunteer assistance will be rendered also by committees of bankers, accountants, postmasters and by the highly trained field force of the department of agriculture. We hope so thoroughly to cover the field that ignorance of the law may not be consistently offered by any taxpayer as an excuse for failure to comply with its requirements. It must not be overlooked that the law plainly imposes upon the taxpayer the duty of seeking the revenue officials and of complying with its provisions and prescribes rigid penalties for failure to comply with them.

"As a practical aid to the millions of new taxpayers, we have devised a comparatively simple, self-explanatory income tax return form for the use of persons having a net income of less than $3000. Many of these people do not keep books or records of accounts. They are not familiar with accounting terms and methods and would be unnecessarily confused if confronted with a form which carried the intricate questions required by the

surtax and excess profits tax features of the law. Consequently, the man of small income, who is subject only to the normal tax of 2 per cent, is to have the benefit of a schedule drafted in the simplest possible form and language. The man of larger income, who is required to compute surtax and excess profits taxes in addition to the normal tax, will be required to use more detailed forms with appropriate instructions.

Some Recommendations Considered

"As illustrative of some of the recommendations touching the excess profits tax, which are now being considered with a view to presenting them to the secretary of the treasury, the following among others may be cited:

"Allowance of reasonable salaries in the case of partnerships and individuals, in order to place them on an equal basis in this respect with corporations. The effect of this allowance would be to transfer a reasonable salary allowance from income derived from capital invested, all of which would otherwise be taxable under the graduated rates of section 201 to section 209 which imposes a flat rate of 8 per cent on salaries and other income. It is readily seen that such a construction is fully within the spirit and intent of the law. It is within the letter of section 209, which allows each individual who really earns a salary by personal exertion, no matter in what business connection, to have it taxed under the 8 per cent provision of section 209.

"That the 8 per cent rate be made to apply to professional men even if a small amount of capital is employed by them.

"That merchants be permitted to make inventories of merchandise either at cost or at market value. That brokers be included on the ground that they are merchants of securities.

"That any taxpayer who is content with a 7 per cent deduction upon his invested capital will not be called upon to make a complete return of his pre-war capital and income.

"You have already observed that the secretary of the treasury has approved of a treasury decision allowing the full exemption provided by the congress to corporations in sections 201 to 203. The difficulty here arose that a definite exemption was provided for in section 203 but the mechanics provided for applying the exemption in section 201 were left incomplete in a limited number of cases. Hence this decision carries out the manifest intent and purpose of the congress.

"Without further taxing you with the details of our study of the law, I would state that we are confident that the rules and regulations to be adopted will interpret the law in a manner which will be in full accord with its intent and in harmony with the methods of legitimate business and the rights of the taxpayers. It is neither hoped nor expected that these regulations will please every taxpayer. They would not be good regulations if they did. The spirit of honest co-operation with the taxpayer, however, is being instilled into every employe of the bureau and will be insisted upon at all times and in all places.

"All taxation is burdensome. War taxes are necessarily so, because they are heavy. The government's needs are pressing, however, and must be met. The law imposes an obligation upon every citizen which he must meet honestly, patriotically and we hope, cheerfully. We have many evidences that American patriotism is responding to this condition."

Mr. Roper made no reference to the question of "invested capital", which has been the big stumbling block to all those attempting to interpret the act.

Value of Awarded Building Contracts Rises

Comparative statistics of building and engineering operations in the territory east of the Missouri and north of the Ohio rivers, as compiled by the F. W. Dodge Co., show that the valuation of contracts awarded for the period from January to December aggregated $1,527,370,000. This compares well with the total of $1,243,998,397 for the same period of 1916 and $857,190,100 for the 1915 interval. Similar statistics compiled for the district comprising western Pennsylvania, West Virginia and Ohio show that during the 11-month period the valuation of contracts awarded was $192,983,000, as compared with $156,564,000 in 1916 and $111,562,000 in 1915.

Will Deal in Steel

The Edgar T. Ward's Sons Co. has been incorporated under the laws of Massachusetts with $2,500,000 capital to engage in the business of buying and selling steel and steel products in Boston, New York, Philadelphia and Chicago, where the firm had maintained offices. The incorporators are John Ward and Edgar Ward, both of Lynnfield, Mass.; W. E. Adams, Boston; J. S. Winn and E. B. Lapham, Evanston, Ill.; Leslie Edgcomb, Philadelphia; E. P. Hall, Collingswood, N. J.; A. J. Lockwood, Glenridge, N. J.; H. W. Lockwood, South Orange, N. J., and F. K. Biggs, New York City.

Pittsburgh Steel Car to Operate Extensively

Plans for a greatly increased production of freight, passenger and refrigerator cars have been laid by the Pittsburgh Steel Car Co., Philadelphia, which was recently organized, at a meeting of the stockholders held in Pittsburgh recently, when the common stock was increased from $100,000 to $7,000,000. The officers elected at this meeting follow: W. A. Scott Jr., president; H. B. Scott, first vice president; T. W. Griffith, second vice president, over department of raw material purchases, F. G. Lillo, third vice president, over department of sales and lumber purchases; Robert Hunter, secretary over the traffic department; H. W. Best, treasurer; Peter Dietz, chief engineer; and George F. Sellers, auditor, under the first vice president. All of the officers, with the exception of the chief engineer and auditor were chosen directors in addition to L. A. Meyran, C. D. Colly, J. H. Gibson, Guy Thorn, S. J. Orr, C. F. Rankin, E. S. Albiez and L. T. Fowler. The executive committee consists of W. A. Scott Jr., chairman; H. B. Scott and T. W. Griffith. The building committee consists of W. A. Scott Jr., chairman; E. S. Albiez, Peter Dietz, George E. Thomas and C. D. Cooly. This plant will have an initial capacity of 100 finished cars a day, and provisions will be made to double this capacity if necessary.

Financial Crop Ends

In a speech before the house of commons, Andrew Bonar Law, chancellor of the British exchequer, stated that the average daily war expenditure for two months past has been $33,611,200.

* * *

The capital stocks of the following concerns have recently been increased: U. S. Auto Lock Co., Chicago, $2500 to $20,000; Aurora Metal Co., Aurora, Ill., $50,000 to $200,000; Rosebrugh Chemical Corp., Syracuse, N. Y., $50,000 to $90,000, and the National Cast Iron Pipe Co., Tarrant City, Ala., $350,000 to $500,000.

* * *

William Deering Stewart, Chicago, has been appointed receiver for the Independent Harvester Co., Portland, Me., formerly the Kellogg Harvester Co. The principal plant owned by the company is at Plano, Ill., and is valued at $500,000. The capital stock is $1,000,000. The incorporation's assets, including the Plano plant, are estimated at about $2,000,000. The petition for a receiver was not contested by the company's attorney.

Tool Market Near Saturation Point

Sudden Diminution in Buying of Large Lots Observed—Crane Market Affected by Same Lethargic Influences—Numerous Small Orders Help to Round Out Market

FOR the first time in months the machine tool and crane markets present the appearance of a real lull. Whether this condition is only a breathing spell or whether it is in some degree lasting, depends wholly upon the government's plans. As the government's various war requirements have poured in, deliveries have been extended gradually further and further ahead. Builders now are booked ahead for many months with orders bearing priority ratings, while the ordinary commercial orders, which these emergency contracts displaced, have been pushed ahead accordingly, in some cases late in 1918, in others well into 1919. There are few important undertakings whose major requirements have not been covered; by this it is not meant that they have the requisite tools, but they have placed their orders and it is up to the machinery industry to make deliveries. The latest big business which stirred the machine tool market consisted of the requirements of the Watervliet arsenal, Watervliet, N. Y. These have been distributed among a number of leading sellers, at an aggregate value running well into millions of dollars. The needs of the American ordnance base depot in France, which includes the gun repair shop, arsenal and other United States government works, soon will be closed out.

Crane Market Quiet

Activity in the crane market the past week, reflecting the situation in machine tools generally, has been comparatively light. The biggest order closed was that of the Federal Shipbuilding Co., 54 Dey street, New York, involving 10 cranes. Of this lot, four 20-ton cranes went to the Milwaukee Crane Co., Milwaukee, while the remainder, including cranes of five and 20 tons capacity, was distributed between the Champion Engineering Co., Kenton, O., and the Northern Engineering Works, 120 Liberty street, New York. The Ingersoll-Rand Co. has awarded the contract for a 5-ton crane for its plant at Painted Post, N. Y. The American International Shipbuilding Corp. has issued an inquiry for two 10-ton cranes. The inquiry of the J. G. White Engineering Corp., New York, for two electric traveling cranes, and that of the Turner Construction Co., New York, for several electric cranes, still are pending.

Destroyer Program Well Under Way

The government destroyer program is well under way, the Fore River Shipbuilding Corp., New York Shipbuilding Co., Newport News Shipbuilding & Dry Dock Co., Union Iron Works Co. and others having completed most of their purchases of tools. Companies receiving contracts for ordnance, to date, have been heavy buyers, but now seem well covered. Airplane engine makers only are occasionally in the market now. Contracts for shells for the most part have been distributed among concerns already at least partially equipped, due to previous allied orders. The three large government shipbuilding plants, constructed by the American International Shipbuilding Corp., at Hog Island, Pa., the Merchant Shipbuilding Corp., at Bristol, Pa., and the Submarine Boat Corp., at Newark Bay, N. J., are well under way, the last named already having begun vessel construction. Many private builders which received vessel contracts from the Emergency Fleet corporation have figured prominently in the market, but now seem well provided for. However, the government continues to let such contracts from time to time, which later will be reflected in the equipment market. Among such orders are the 16 steel ships let to the Southern Shipbuilding Corp., Charleston, S. C., and the 10 steel ships let the Chickasaw Shipbuilding Corp., subsidiary of the Tennessee Coal, Iron & Railroad Co. The Chickasaw company will build an assembling yard at Mobile, Ala. These requirements so far as known are not yet filled. Despite the practical cleaning up of the various big lists, a number of small inquiries and sales are reported, as the various munition makers and other manufacturers appear in the market for filling out requirements.

Shipbuilders Plan Extensions

The New York Shipbuilding Corp., Camden, N. J., contemplates the installation of additional plate bending rolls and other equipment. The Ludington Machine Co., Waterbury, Conn., has let the contract for a plant addition to Tracy Bros. Co., Waterbury. The navy department has awarded the contract for a brass foundry at Washington to cost $255,000 to the C. Moses Construction Co., Washington. The navy department also has awarded the Evatt Construction Co., Boston, the contract for a $200,000 power house and machine shop to be built at New London, Conn. The Northern Transportation Co., Manistee, Mich., has about completed its plans for a shipbuilding plant. Architects Harris & Richards, Drexel building, Philadelphia, have drawn plans for a plant which may be built at an estimated cost of $2,000,000, for the Niles-Bement-Pond Co., 111 Broadway, New York.

Holiday Lull Sets In

ALREADY the usual holiday lull is appearing in the Chicago machine tool market. About the only new business being taken consists of small lots of equipment. The small buyer seems to be out of the market owing to the present high prices so that only the larger users with government contracts can take machinery at present. The ordnance companies recently organized in Wisconsin are not buying equipment now. The second lot of tools for the Rock Island arsenal has been bought except a few scattering tools and some small equipment like bench tools, vises and portable floor cranes. The Illinois Central railroad has issued a list containing 5 tools. Increased difficulty is being experienced as to prompt delivery. This is especially true of boring mills on which delivery of nine to ten months is about the best that can be obtained. This situation appears to be growing worse each month. An interesting sidelight appears in the recent purchase by the Federal Reserve bank of Chicago of a 2000-pound paper punch press fitted with an angular knife to be used in clipping coupons

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Making a Tensile Test of AGATHON Steel.

Certainty of performance is an AGATHON attribute resulting from AGATHON QUALITY.

When we sell an AGATHON steel for any particular purpose, we know that it will do everything it is intended to do and more than is expected of it, because we put it to the special tests it will be called upon to withstand in service as well as the usual laboratory tests which *ALL* AGATHON Steels receive.

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Cleveland Office: Hickox Building
The Hamill-Hickox Company, District Representatives

Chicago Office: 1370 Peoples Gas Building, 122 South Michigan Blvd., A. Schaeffer. Dist. Sales Manager

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from liberty bonds. Removing the first coupon from bonds which have not yet been delivered, numbering hundreds of thousands, is too great a task for hand work and they will be cut in bundles of 50 or 100 by the use of this machine. The Racine Motor Truck Co. will build a factory at Appleton, Wis. The Falk Co. at Milwaukee is building a large addition to its machine shop; the Harley Davidson Co. is building a plant at Milwaukee; the Gulf Colorado & Santa Fe railroad is planning a machine shop at Temple, Tex. George P. Nichols & Bros., Chicago, will build a plant for the manufacture of railroad machinery. Deere & Co., Moline, Ill., are building a plant for the manufacture of agricultural implements. McCord & Co., Chicago, are building a foundry and transformer room.

Figure on Big Shell Contract

CLEVELAND machine tool dealers and builders who are devoting their entire time to meeting the demands for equipment which have been occasioned by government and quasi-government work are supplying tools for wide distribution. Dayton manufacturers in their requests for tools have been especially active in the Cleveland market for some time past. Many companies which have been figuring on government contracts but have not received these as yet, have proceeded under definite notice from Washington with their programs of expansion. These companies, in case of failure to secure government work, it is said, will be reimbursed. Other companies have not been so fortunate and these constitute the majority of those having machine tool lists still pending. A large contract for 3-inch shells soon to be awarded has been productive of inquiries in the Cleveland market for machine tools from five Cleveland manufacturers. Approximately $200,000 worth of equipment is involved in the lists. The Templars Motor Corp., Cleveland, which inquired for equipment some time ago, is reported to have received a government contract and accordingly has closed with one dealer for tools valued at $125,000. The same company also bought tools worth $50,000 from another dealer. The tools purchased consisted principally of lathes, shapers, drill presses and milling machines. The F. B. Stearns Co., Cleveland, which is said to have received a contract for Rolls-Royce aviation motors, recently closed for tools valued at $50,000, inquiry having been made a few weeks ago. This lot consisted principally of lathes and milling machines. The Cleveland Tractor Co., Cleveland, it is reported soon will enter the market for additional equipment. The Hydraulic Pressed Steel Co., Cleveland, is building a large addition to its forge shop.

Cincinnati Builders Swamped with Orders

DIFFICULTY is experienced in estimating how far ahead Cincinnati machine tool builders are sold up. With the probable exception of shaper makers the general average would be close around June 1. Some new business can yet be taken, but any large contracts accepted would mean augmenting present forces, which is a difficult matter. A few firms have tried out the experiment of using female labor on light work, and it is said to have been successful. Some complaint is made as to deliveries of machine shop supplies, but with the exception of castings, these complaints are due to transportation delays. The Ideal Machine & Tool Co., Cincinnati, has purchased at auction the tools and equipment of the New World Mfg. Co., also of Cincinnati. In addition, the Ideal Machine company has purchased considerable new machinery.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

MANCHESTER, N. H.—L. H. Shadduck, Inc., has been awarded the general contract for a 1-story, 58 x 80 foot foundry addition to be built by George A. Leighton. The cost will be $8000.

PORTSMOUTH, N. H.—An appropriation is under consideration in congress for brick, steel, concrete and hollow tile additions to the machine shop and to the foundry at the navy yard. The cost of the proposed additions is estimated at $200,000 and $130,000, respectively.

BOSTON.—The Brown-Wales Co., 83 Olney street, manufacturer of iron and steel products, will build a machine shop.

BOSTON.—C. L. Berger & Sons, makers of instruments, will build a reinforced concrete, fireproof, 1 and 2-story, 22 x 372-foot addition to their plant at 37 Williams street.

BOSTON.—The Universal Rotary Refrigerating Co. has been incorporated with $150,000 capital. Albert H. Wright, Charles H. Clark and T. J. Graham are the incorporators.

CHELSEA, MASS.—Miller & Wolfert will build a brick, 3-story, 24 x 64-foot addition to their factory at Eastern and Webster avenues.

EVERETT, MASS. — A permit has been granted to the General Electric Co. for a 1-story, steel foundry to be built at the foot of Tileston street. The Levering & Garrigues Co., Boston, has the contract. Cost estimated at $35,000.

SALEM, MASS.—The Walter G. Ruggles Co., Foster court, manufacturer of valves, will build a 2-story addition to its machine shop, to be of mill construction with concrete base, 40 x 100 feet in size. Cost will be about $15,000.

WESTBORO, MASS.—W. F. Fraser has awarded a contract for an addition to his plant for the manufacture of grinding tools and machinery.

WESTFIELD, MASS.—The Brian Heater Co., Railroad street, has let contract for a 2-story brick factory, 50 x 100 feet, to cost about $18,000.

PAWTUCKET, R. I.—The Pilgrim Machine Co. has been incorporated to make machinery with $25,000 capital. Arthur M. Allen, Frederick W. Tillinghast and James J. McGovern are incorporators.

PROVIDENCE, R. I.—The Metals Corp. has been incorporated to make metal products with $100,000 capital. Thomas R. Kilkenney, H. W. Kilkenney and T. C. Foster, are incorporators.

BRIDGEPORT, CONN. — The Bridgeport Machine & Tool Mfg. Co. has been incorporated with $10,000 capital by Joseph Martin, Max Sydel and F. M. Pious.

GILDERSLEEVE, CONN. — The shop of

CHRISTMAS GREETINGS From ROLLING MILL JIM

Merry Christmas fellows and only wish that I was with you all to hoist one of those good old Christmas comforts.

So long,

Rolling Mill Jim.—

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

the Charles L. Jarvis Co. and a small power plant of the Gildersleeve Ship Construction Co. were damaged by fire, Dec. 10, with a loss of $10,000.

NEW BRITAIN, CONN.—The Traut & Hine Mfg. Co. has let the contract for a brick, 1-story, 34 x 40-foot building to be used for the fireproofing of gun slings for the government.

NEW LONDON, CONN.—The government has authorized the Groton Iron Works to expend $3,000,000 in enlarging its plant which is to be utilized in the construction of steel and wooden merchant boats for the Emergency fleet. Purchases of tools are being made for installation at the Groton plant.

STAMFORD, CONN.—A syndicate headed by Morris C. Rosenbaum, New York, will build a 2-story reinforced concrete, 90 x 300-foot addition to the plant of the John Davenport Co. on Canal street, which it has recently acquired.

WATERBURY, CONN.—The F. L. Garrigus Co. has been incorporated to engage in an electrical business with $25,000 capital by T. F. Carmody, W. E. Monagan and W. J. Larkin Jr.

WATERBURY, CONN. — The Waterbury Co. has been incorporated to make machinery with $25,000 capital. A. C. Moss, Richard C. Ratto and Francis T. Reeves are interested.

Along the Middle Atlantic Seaboard

BROOKLYN, N. Y.—I. Shonberg has been incorporated with $10,000 capital to manufacture metal alloys. I. Shonberg, 137 Putnam street, is in charge.

BROOKLYN. N. Y.—Walter P. Pfaudler, architect, is drawing plans for a 6-story, 200 x 300-foot manufacturing plant for the E. W. Bliss Co., Inc. James W. Lane is president of the company.

BROOKLYN, N. Y.—The C. Hartmann Co., sheet metal worker, 985 Dean street, has increased its capital from $10,000 to $80,000 and will build an addition to its plant.

BROOKLYN, N. Y. — Contract has been awarded to the Turner Construction Co., Boston, for the erection of a 4-story reinforced concrete factory to be built by the National Lead Co.

BROOKLYN, N. Y.—John N. Huber, 65 West Houston street, has awarded to W. L. Goeltz, 50 Broad street, New York, the contract for a boiler-works extension to cost $4000.

BROOKLYN, N. Y.—The Robbins-Ripley Co., 27 Fort Harrison street, has been awarded the general contract for the erection of a $5000 pump house to be built by the New York Dock Co., 44 Whitehall street, New York.

BROOKLYN, N. Y.—The Brooklyn Union Gas Co. is having plans drawn for a 2-story, 37 x 44-foot gas manufacturing plant to cost $10,000. James H. Gordon, 176 Remsen street, is president of the company.

BUFFALO.—A plant addition to cost $37,500 is being planned by the Donner Steel Company.

BUFFALO. — The Buffalo Forge Co. is having plans drawn for a 1-story plant addition.

BUFFALO.—The Automatic Transportation Co., 2933 Main street, has awarded the contract for a 2-story machine shop.

GENEVA, N. Y.—J. O. Jensen & Co. will build a plant for the manufacture of machinery. The company has been incorporated recently with a capital of $50,000. J. O. Jensen is in charge.

LOCKPORT, N. Y.—The Simons Mfg. Co. has awarded to Morris & Allen, Buffalo, contract for the erection of a plant addition.

LONG ISLAND CITY, N. Y.—The Motor Starter Corp., recently organized, has purchased a site for the erection of a plant.

LONG ISLAND CITY, L. I.—The Astoria Light, Heat & Power Co. plans the erection of a 1 and 4-story, 101 x 151-foot grinding plant to cost $25,000. William E. Bradley, 130 East Fifteenth street, New York, is president.

NEW YORK. — The Whitney Steamship Corp. has been organized with a capital of $100,000. The incorporators are R. E. Miller, B. L. Stafford and L. B. Eppstein, 19 Cedar street.

NEW YORK. — The High Speed Steel Products Corp. has been chartered with $27,500 capital. The incorporators include A. F. McCabe, F. H. Butehorn and A. E. Moore, 37 Wall street.

NEW YORK.—The Merrill Spring Co. has let a contract to the Standard Concrete Steel Co., 105 West Fortieth street, for a 1-story, 50 x 100-foot plant addition to cost $40,000.

NEW YORK.—The Electric Welding Co., 801 Vernon avenue, will build a machine shop at the foot of Court street, to be one-story high and 35 x 70 feet in size.

NEW YORK.—The Craemer Nail & Supply Co., 2 Rector street, has increased its capital from $10,000 to $50,000 to provide for the erection of plant additions.

NEW YORK.—The Standard Concrete Machinery Co., 233 Broadway, has increased its capital from $100,000 to $250,000 to provide for proposed plant extensions.

NEW YORK.—The Imperial Metal Mfg. Corp. has been chartered with a capital of $175,000 to manufacture perforated metal tops, etc. The incorporators include C. Bomeister, S. Messner, O. Sondheim and others, Long Island City, N. Y.

NEW YORK.—The Auto Traffic Safety Appliance Co. has been incorporated with $100,000 capital to manufacture machinery and metal parts for motor vehicles. The incorporators include C. Pergola, A. Farese and F. B. Pergola, 141 Hester street.

NEW YORK.—Anderson & Jackson, 722 Court street, have awarded the contract for a foundry to be built at Hoyt and Fourteenth streets.

NEW YORK. — The French Sheet Metal Works has been incorporated with $10,000 capital. The incorporators are M. M. Alpert, J. Cohen and H. Coppel, 18 West 108th street.

NEW YORK.—The Batavia Steel Products Corp. has been organized with $1,000,000 capital to engage in a manufacturing business. The incorporators are George V. Reilly, Samuel B. Howard and Arthur W. Britton, 80 Broadway.

OLEAN, N. Y.—The city plans to erect a filtration plant to cost $75,000.

PORT IVORY, S. I., N. Y.—The Proctor & Gamble Mfg. Co. plans several plant extensions, including a generator house, a machine shop, and a hydrogen house.

SYRACUSE, N. Y.—The Church & Dwight Co., 27 Cedar street, New York, plans to erect a 3-story reinforced concrete warehouse, 93 x 240 feet on Willis avenue. The cost is estimated at $100,000. Starrett & Van Vleck, 8 West Fortieth street, New York, are preparing the plans.

UTICA, N. Y.—The Utica Steam Engineering & Boiler Works plans the erection of a 1-story, 46 x 96-foot plant to cost $88,500. R. Richards & Son are the builders.

WATERTOWN, N. Y.—The city plans to erect a power plant and fireproof power house, to cost $300,000. S. M. Greene & Co., 293 Bridge street, Springfield, Mass., are architects.

CANONSBURG, PA. — The Canonsburg Steel & Iron Works has been sold to a group of Cincinnati capitalists, who will enlarge the plant and install new machinery and equipment. The company is capitalized at $250,000, and manufactures sheet steel and metal specialties. John M. Watson is general manager.

CHESTER, PA.—The American Locomotive Works contemplates the erection of a plant addition. The Belmont Iron Works, Twenty-second street and Washington avenue, Philadelphia, is preparing tentative plans.

GROVETON, PA.—The Lewis Foundry & Machine Co. has increased its capital from $210,000 to $1,000,000 to provide for plant expansion.

LEBANON, PA.—The Lebanon Blast Furnace Co. has sold its plant to E. J. Lavino & Co., who will make a number of additions and extensions.

LEETSDALE, PA. — The Peerblow Mfg. Co. has been chartered with $10,000 capital to manufacture blow torches. F. P. Schmidt, treasurer of the company, is in charge.

MANAYUNK, PA.—The Acme Boiler & Furnace Co. plans alterations to its plant to cost $8000.

NORTHEAST, PA.—The Blane-Mackay-Lee Co. will build a lumber mill costing $100,000 to replace the one recently damaged by fire.

PHILADELPHIA.—Bids are being taken for an addition to the plant of the Esterbrook Steel Pen Co. Barringer & Perrot are architects.

PHILADELPHIA.—A 1-story 44 x 141-foot machine shop will be erected by the Austin Co., Cleveland, for the Espen-Lucas Machine Co. Cost will be $20,000.

PHILADELPHIA.—The Aluminum Brazing Co. has awarded the contract for a 1-story mill to cost $6000. F. F. Davis, Chester, Pa., is in charge.

PHILADELPHIA. — A permit has been granted to C. V. Roberts to erect a machine shop at Ruan and Lackawanna streets, to cost about $7000.

PHILADELPHIA.—The Gorgas-Pierre Mfg. Co., 144 East Allen street, has awarded to the Turner Concrete Steel Co., 1713 Sansome street, a contract for the construction of a 3-story concrete warehouse, to be 75 x 156 feet.

PITTSBURGH.—The city has awarded to

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"Farrell-Cheek" Service is no Secret

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"Farrell-Cheek" Service is ***quick-action*** service—emergency service—service that backs up our promises of delivery—service that enables us to get your castings out just when we promised.

In order to do this it is necessary for us to hold 30% of our entire capacity open for rush work—and it's also necessary for us to have a large organization of very capable men—for we guarantee ***quality*** as well as ***speed.***

Write us when you require

Small Steel Castings

for

Tractor Work, Machine Tool Work, Truck Work, etc.,

and

Blank Gears, and Carbonizing and Case Hardening Boxes.

FARRELL-CHEEK STEEL FOUNDRY CO.

SANDUSKY, OHIO

Branch Offices:

New York Philadelphia Chicago

Say you saw it in THE IRON TRADE REVIEW

F. F. Schellenberg a contract for the construction of a heating tunnel to cost $29,000.

PITTSBURGH.—The Electric Co., Lexington avenue, plans to erect a factory, 50 x 200 feet to cost about $40,000. C. D. Cooley & Co., Century building, are preparing plans.

PITTSBURGH.—The Ward-Mackey Biscuit Co. plans to erect a factory on North Lexington avenue, to cost about $350,000.

PITTSBURGH.—The Heppenstall Forge & Knife Co. plans to erect a 1-story concrete and steel machine shop 130 x 408 feet, at Forty-seventh and Hatfield streets. The cost will be about $40,000.

PITTSBURGH.—The Miller-Owen Electric Co. is having plans prepared for a 1-story brick factory, 50 x 200 feet, to cost about $40,000. The C. D. Cooley Co. is the architect.

READING, PA.—The Carpenter Steel Co. will build a 1-story annealing furnace building to cost about $8000.

SCRANTON, PA.—F. J. Hoffman, secretary of the traffic and industrial bureau, Scranton board of trade, has asked this commission for a special permit on behalf of a company which contemplates the erection of a large gray iron foundry.

TACONY, PA.—Contracts have been awarded to Barcley, White & Co. for a 45 x 50-foot power house and a 1-story 30 x 50-foot storage house to be built by the Tacony Ordnance Co.

WEATHERLY, PA.—The Midvale Steel & Ordnance Co., Midvale, Pa., will build a steel mill here.

BLOOMFIELD, N. J.—The Power Specialty Co .will erect a new plant on Locust avenue to cost $31,000.

CAMDEN, N. J.—The Columbia Bronze Foundry Co. has increased its capital from $10,000 to $100,000 to provide for extensions to its plant at 529 Columbia avenue.

CARTERET, N. J.—The U. S. Metal Refining Co., Chrome, N. J., has obtained a site containing 120 acres, on which it plans to build a plant.

JERSEY CITY, N. J.—The Turner Automatic Fan & Mfg. Co. proposes to build a factory for the manufacture of motor-driven fans. The company has been organized recently.

JERSEY CITY, N. J. — Hudson Welding Co. has been chartered with $50,000 capital to engage in the welding business. Anton Malaboraki, W. J. Wurkowski and Leonard Galewski, are the incorporators.

JERSEY CITY, N. J.—The Hudson county boulevard commission contemplates making improvements at its lighting plant at Snake Hill to cost $150,000.

NEWARK, N. J.—The Upson Walton Co., Riverside avenue, will erect a 1-story brick factory, 28 x 125 feet in size, to cost $10,000.

NEWARK, N. J.—The Federal Real Estate Co., 41 Bryant street, will erect a 1-story brick machine shop, 34 x 90 feet in size.

NEWARK, N. J.—The Butterworth-Judson Corp., Avenue R, will erect a 2-story frame factory, 20 x 133 feet in size, to cost $11,000.

NEWARK, N. J.—The Levy Bros. Co., 724 South Eleventh street, will erect a 2-story brick factory, 40 x 50 feet in size, to cost $7000.

NEWARK, N. J.—The Federal Shipbuilding Co., 54 Day street, New York, is in the market for forging equipment for its new shop.

NEW BRUNSWICK, N. J.—The Wright-Martin Aircraft Corp. will build an addition to its aluminum foundry on Stelton street.

NUTLEY, N. J. — The Nutley Machine Works, Inc., has been chartered to manufacture and deal in engines, with $25,000 capital. J. H. MacDonald, T. W. Holderfield, Newark, and Nathan Schwartz, Belleville, N. J., are incorporators.

PORCITE, N. J.—The Atlas Powder Co., Wilmington, Del., has awarded to the Austin Co., 14320 Euclid avenue, contract for the erection of a sulphuric acid plant, to comprise an absorber house, a burner house, blower house and converter house.

TRENTON, N. J.—The Horn & Brannen Mfg. Co. has been organized with $60,000 capital. The incorporators are Henry Donohoe, Herman Corn and Fred Pfeffer.

TRENTON, N. J. — The Reeves-Cubberly Foundry Co., Parker and Logan avenues, will build a number of additions to its plant.

WHARTON, N. J.—The plant of the Wharton Steel Co. has been damaged by fire with about $10,000 damage.

WILMINGTON, DEL.—A new steel plant and power house will be erected at the Baldt plant of the Penn Seaboard Steel Corp., which will cost about $2,000,000, it is estimated. Rodney Thayer is president of the Penn company.

GLENARM, MD.—The F. X. Hooper Mfg. Co., manufacturer of printing presses, will rebuild its plant, recently damaged by fire.

LYNCHBURG, VA.—The Lynchburg Foundry Co. will build a 1-story foundry to cost $60,000. Wiley & Wilson are engineers.

WASHINGTON.—F. R. Harris, chief of the bureau of yards and docks, has awarded to the Doyle-Robertson Construction Co., the general contract for 1-story, 72 x 160-foot forge shop addition.

Activities in the Central States

AMERY, WIS.—Articles of incorporation have been filed by the Minnesota Masterlock Co. The capital stock is $10,000 and the incorporators are W. T. Kennedy, F. E. Yates and I. G. Ogden.

APPLETON, WIS. — The Racine Motor Truck Co., organized recently with a capital stock of $500,000, is preparing to erect the first unit of its plant at Spencer and Story streets, to be 60 x 300 feet in size, of reinforced concrete and brick construction, with steel trussed roof. The cost will be about $50,000.

BELOIT, WIS.—The Gardner Machine Co., manufacturer of disc grinders and abrasive wheels, has awarded contracts for the construction of a reinforced concrete and brick addition to its pattern shop and warehouse. The Newton Engineering Co., 185 Mason street, Milwaukee, is the general contractor.

EAU CLAIRE, WIS.—The United States Gear Shift Co., recently incorporated in Maine with $1,500,000 capital, has awarded contracts for the erection of the first unit of its new plant. The building will be four stories, 65 x 80 feet, and contain a brass and aluminum foundry, machine and finishing shop, assembly and testing room, offices and a transformer house. The work is in charge of R. L. Rickman, general contractor. The company will manufacture hydraulic gear-shifting devices under the patent of L. A. Laursen, mechanical engineer, who is secretary and general manager.

IOLA, WIS.—Articles of incorporation have been filed by the Iola Light, Power & Mfg. Co. The capital stock is $25,000 and the incorporators include Edwin J. and George Nehls.

JANESVILLE, WIS.—The Janesville Electric Co. plans to install a 150-horsepower water turbine unit in its hydro-electric plant on the Rock river.

MADISON, WIS.—The Wisconsin Foundry & Machine Co., 623 East Main street, will build an addition, for which a permit has been issued.

MILWAUKEE.—The Modern Steel Treating Co. has been organized by George Haubert, C. W. Esau and Adam J. Eimermann.

MILWAUKEE.—The Jambor Mfg. Co. has been chartered to manufacture metal stampings and machinery with a capital of $30,000. The incorporators are John Jambor, John E. Jambor and McKinley W. Jambor.

MILWAUKEE.—The Liberty Foundry Co., recently incorporated with $30,000 capital, will build a plant 60 x 120 feet in size. The company offices are at 867 Grand avenue.

MILWAUKEE.—Contract for a 1-story addition, 36 x 47 feet in size, to the forge and blacksmith shop of the Milwaukee Reliance Boiler Works, 1102 Thirty-second street, has been awarded to John Wilging, general contractor. John E. Sharp is president of the company.

SUPERIOR, WIS. — The Great Northern railway has awarded the general contract for the construction of a new ore dock at Allouez bay, to A. Guthrie & Co., Inc., 366 Jackson street, St. Paul. The dock will cost about $1,000,000.

WEST ALLIS, WIS.—The Allis-Chalmers Mfg. Co. contemplates the construction of several forge shop additions to cost $1,000,000.

DETROIT.—The American Car & Foundry Co. will build an addition for an artillery machine shop and assembling plant at a cost of $30,000. J. H. Ames, 445 East Ferry avenue, is engineer.

GRAND RAPIDS, MICH.—The Truman M. Smith Machine Co. has been granted a charter to manufacture machinery and foundry equipment with $60,000 capital. The incorporators include T. M. Smith, I. P. Rice and Gerald McCoy.

MANISTEE, MICH.—The Northern Transportation Co., Baltimore, is having plans prepared for a shipbuilding plant. T. J. Donohue, 516 Muncie building, Baltimore, is secretary of the company.

PORT HURON, MICH. — A charter has been granted to the American Machine Corp. to manufacture machinery with $10,000 capital. Incorporators are A. G. Armstrong, E. B. Armstrong and S. J. Cheatham.

CAIRO, ILL.—The Menominee Electrical Co., Menominee, Mich., manufacturer of electric fans and other devices, will move its plant to this city. A new factory will be

"OHIO SPECIAL"
Cold Drawn Seamless Steel Tubing

for
Ball Bearings and Roller Bearings
Our entire efforts are concentrated on Quality
"Made in Shelby" to any Special Analysis
Still the Same "Old Reliable"
If you require Quality give us a call
Fourteen Grades of Steels
THE OHIO SEAMLESS TUBE Co
SHELBY
OHIO

Say you saw it in THE IRON TRADE REVIEW

erected at once on a site of three acres served by three railroads. The purpose of the change according to Henry Tideman, president and general manager, is to get nearer the company's market, which is the south.

CHICAGO.—The Nubian Paint & Varnish Co. has purchased tract adjoining its works on LeClaire avenue, on which it will build a plant extension.

CHICAGO. — The Union Special Machine Co. has bought a large site at Kinzie and Franklin streets, and is having plans prepared for a new building to cost $200,000. George C. Nimmons is architect.

CHICAGO.—The Lasker Iron Works, 1849 West Thirty-second street, has awarded contract for a 1-story addition to its plant, to cost $5000.

CHICAGO.—The Chicago surface Lines will erect a number of buildings at Clark street and Schreiber avenue, including two car barns, a large power plant and an office building. It is estimated that the total cost of the improvements will be $500,000.

CHICAGO.—The Vierling Steel Works, 313-23 Twenty-third street, has let contract for a 1-story brick factory to cost about $20,000.

CHICAGO.—A permit has been granted to the Chicago Bearing Metal Co., 2252 West Forty-third street, to erect a 1-story factory addition.

CHICAGO.—The Iroquois Iron Co. plans a slag handling plant to cost $100,000 at its South Chicago furnace.

JOLIET, ILL.—The Chicago & Joliet Electric Railway Co. contemplates the construction of a substation at Osgood and St. Louis streets and one at Delwood Park, to cost, jointly, $50,000.

MADISON, ILL.—The Tri City Steel Co., S. E. Camp, president, 202 Railway Exchange building, St. Louis, will build a steel mill and warehouse, 100 x 390 feet in size, to cost $100,000.

MONMOUTH, ILL. — The V. A. Smith Co., Chicago, manufacturer of boilers and furnaces, will enlarge the plant of the Maple City Foundry Co., which it has recently purchased. W. C. Talbot is manager.

WOOD RIVER, ILL.—Sears, Roebuck & Co., Chicago, have bought 280 acres on which they will build a plant for the manufacture of stoves, tractors and other products.

EVANSVILLE, IND.—The National Fuel Saving Co. has been incorporated with $50,000 capital to manufacture smoke consuming devices. Henry C. Kleymeyer, Alfred A. Klein and Martin Mannheimer are incorporators.

HAMMOND, IND. — The Standard Steel Car Works has obtained a permit to build a plant addition costing $250,000.

NEWCASTLE, IND.—The Davis Foundry Co. has been organized with $40,000 to engage in the production of castings. The directors are John G. Hey, Louis B. Patterson, William Davis, B. F. Netz and N. Guy Jones.

AKRON, O.—The Whitman & Barnes Mfg. Co. contemplates erecting a factory addition on Buchtel avenue. The building will be of brick fireproof construction, with metal sash.

AKRON, O.—The International Harvester Co. has awarded to the T. E. McShaffery Construction Co., 173 South Forge street, the contract for the erection of its new $35,000 warehouse.

CINCINNATI.—The Pollak Steel Co. has taken a large contract from the government for battleship and torpedo boat destroyer forgings and will erect a plant addition at once.

CINCINNATI.—C. L. Harrison, W. E. Fox, Charles P. Taft and others are interested in a proposed 8-story reinforced concrete freight terminal and warehouse, to be built at a cost of $3,000,000.

CINCINNATI. — The Progressive Sheet Metal Co. has been chartered with $50,000 capital. The incorporators include Fred L. Emmert, Edward G. Weiler, Robert L. Mahatha and John H. Mumaw.

CINCINNATI.—The Richter Brass Co. has been organized by John H. Richter, Joseph A. Richter, Adolph D. Fennel and others. The company is capitalized at $35,000.

CLEVELAND.—The Cleveland Brass Products Co. has been incorporated under a Delaware charter with $3,000,000 capital. The incorporators include Edward C. Decust, Mark W. Cole and C. R. Hamilton, 319 Guardian building, Cleveland.

CLEVELAND.—The Kain & Aunger Co. has been granted a charter and will engage in the manufacture of sheet metal. The company is capitalized at $10,000 and the incorporators are Robert Kain and E. F. Aunger.

CLEVELAND. — The National Malleable Castings Co. will build a plant addition to cost $60,000 at 10600 Quincy avenue. The structure will be of steel and concrete. Hubbell & Benes, 4500 Euclid avenue, are architects, and the F. W. Mark Construction Co., 314 Leader-News building, is the contractor.

CLEVELAND. — The Hydraulic Pressed Steel Co., Hydraulic avenue and East Sixty-first street, has obtained a permit for a 1-story factory building, 80 x 600 feet, and a 1-story boiler house 48 x 102 feet. The former will cost $300,000 and the latter $30,000, it is estimated, Westinghouse Church Kerr & Co., 37 Wall street, New York, are the contractors.

CLEVELAND. — The Winton Engine Co., 2116 West 106th street, will build a pattern shop adjoining its plant. Alexander Winton is president.

CLEVELAND. — The New York Central railroad has obtained a permit for the erection of a 39 x 79-foot power plant at the foot of West Third street. The plant will be used for heating coaches and will cost $8000.

Western and Intermountain Territory

VIRGINIA, MINN.—The city has awarded a contract to Risberg & Marwick for building a heating pipe tunnel to cost $5700.

BURLINGTON, IOWA. — G. G. Higbee, Washington and Central avenues, will build a 77 x 106-foot concrete shop for the manufacture of engines. The cost is estimated at $50,000. W. F. Weibley, Tama building, is architect.

FORT MADISON, IOWA.—The Santa Fe railroad plans to build additions to its machine shops which will cost about $2,000,000. F. M. Bisbee, Amarillo, Tex., is chief engineer.

OGDEN, IOWA.—The Ogden Mfg. Co. has been incorporated with $10,000 capital to manufacture anti-skid devices and truck chains. The incorporators are O. M. Needham, O. Nelson and Orson Peterson.

KANSAS CITY, MO. — The Akers Mfg. Co. has been incorporated to manufacture iron and brass castings with a capital of $30,000. H. H. Akers, A. A. Buxton and L. A. Buxton are interested.

KANSAS CITY, MO. — The Henry Weis Mfg. Co. has been incorporated to manufacture sheet metal products with $50,000 capital. The incorporators include Thomas H. Ridge, Henry Weis and Robert Vance.

ST. LOUIS.—The American Die Mold Co. has been chartered with $50,000 paid in capital to manufacture dies, molds, etc. G. Howard Thompson is in charge.

ST. LOUIS.—The N. O. Nelson Mfg. Co., plumbers' supplies, has increased its capital from $1,500,000 to $2,500,000 and will add to its plant.

TEXARKANA, ARK.—The Missouri Pacific railroad plans to install considerable new machinery in its machine shops. E. A. Hadley, St. Louis, is chief engineer.

TEXARKANA, ARK.—The Williams Mill Mfg. Co. is in the market for boring machines, especially drill presses.

DALLAS, TEX. — The Dallas Power & Light Co. plans to expend $3,000,000 on improvements within the next five years. These will include three substations, underground wire system, extensions to generating and transmission facilities and extensions to overhead cable systems.

HOUSTON, TEX.—The Petroleum Refining Co. plans to build a large machine shop.

QUENAH, TEX.—Plans are being prepared by H. E. Elrod, engineer, Interurban building, Dallas, Tex., for a waterworks system to cost $150,000.

BUFFALO, OKLA.—The city contemplates the construction of a waterworks system. Address the mayor.

CYRIL, OKLA.—The citizens will vote on a bond issue of $20,000 to provide for the construction of a waterworks system. A. W. Funnell, mayor, is in charge.

HENRIETTA, OKLA.—The Missouri, Oklahoma & Gulf railroad is having plans prepared for the construction of a roundhouse and machine shop to cost $100,000. N. C. Van Natta, chief engineer, Muskogee, Okla., is in charge.

MARIETTA, OKLA.—The Mitchell Round Bale Co. is in the market for about $20,000 worth of machinery and equipment.

QUAPAW, OKLA.—Citizens will vote Jan. 1 on a bond issue of $75,000 for construction of a waterworks and sewerage system.

ATCHISON, KANS.—The Locomotive Material Co. will build a 2-story machine shop, 75 x 100 feet in size.

GLENROCK, WYO.—The Glenrock Foundry & Machine Co. has been organized with $100,000 capital and will engage in the making of castings and machinery. A site has been secured for a plant. Stuart Anderson, president, is in charge.

POCATELLO, IDAHO.—Bids will be received until Dec. 21 by C. W. Pomeroy, clerk of the county commissioners, for a 60-foot highway bridge.

Interior of an Austin Standard No. 2 Factory-Building recently completed for the Cleveland Tractor Co., Cleveland, Ohio.

18,000 Square Feet in 26 Days
—4 Days Ahead of Time

THE Cleveland Tractor Company moved into this building 26 working-days after date of order. The building was ordered October 11, 1917. The owner's acceptance is dated November 22. Notwithstanding 9 days of heavy rain, the building was ready 4 days ahead of time.

The building is an Austin Standard No. 2 30-day Factory-Building, 90 feet wide and, in this case, 200 feet long.

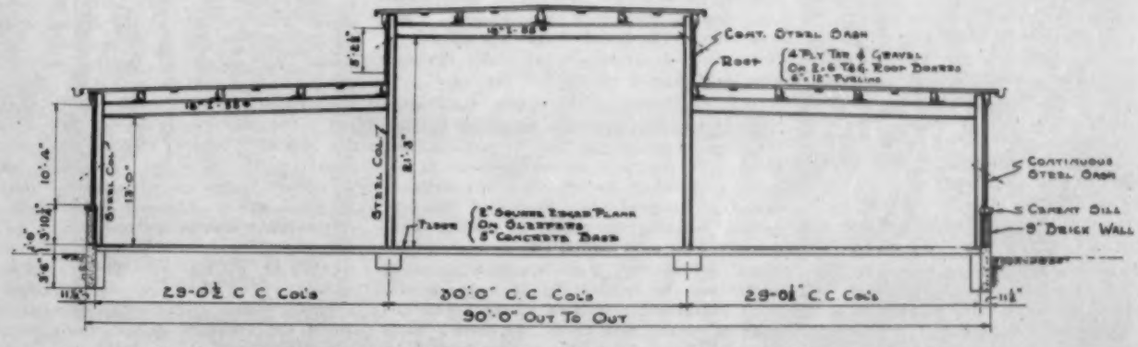
This was not a "rush" job. Austin Standard Buildings are ready in design and detail; basic costs are known and the essential materials are in stock ready for shipment.

Three standards are sold on guaranteed 30-working-day delivery; four standards on guaranteed 60-day delivery, and two standards (multiple story buildings) in longer time.

The Austin Company takes the entire responsibility from design to delivery, guaranteeing cost and time of completion.

The Austin Company
INDUSTRIAL BUILDERS

Cleveland	16210 Euclid Avenue	Eddy 4500
Detroit	Penobscot Building	Cherry 3894
Indianapolis	Merchants' Bank Bldg.	Main 6428
New York	217 Broadway	Barclay 8886
Pittsburgh	House Building	Court 1193
Philadelphia	Bulletin Building	Spruce 1291, Race 4017
Washington	Bellvue Hotel	Main 2550



Cross-Section of an Austin Standard No. 2 Factory-Building, delivered complete in any reasonable length in 30 working-days.

New Business in Eastern Canada

WASHINGTON.—The Fairbault Construction Co., 15 Park Row, New York, has received the contract for a 4-story, 138 x 320-foot, brick and concrete pattern shop and woodworking building to be erected at the navy yard.

GALT, ONT.—P. H. Secord & Son, Sydenham street, Brantford, Ont., have been awarded contract for the erection of an addition to the foundry of the Canada Machinery Corp. Concession and Water streets, to cost $30,000. A 25-ton crane will be installed.

GALT, ONT. — The Canadian Machinery Corp. will erect an addition to its plant at a cost of $30,000.

TORONTO, ONT.—The Bond Engineering Works, Ltd., is asking bids for the construction of an addition to its foundry on Villiers street, to cost $9000.

TORONTO, ONT.—The board of control has authorized the installation of air chambers at the main water works pumping station. Cost is estimated at $50,000. Bids will be received by the commissioner of public works.

TORONTO, ONT.—The Polson Iron Works has been severely damaged by fire Dec. 6, with a loss estimated at $250,000.

TORONTO, ONT.—The hydroelectric power commission will make extensions to the plant of the Ontario Power Co. to cost $1,000,000. Sir Adam Beck is chairman of the commission.

TORONTO, ONT.—Construction work will commence immediately on the erection of a new pattern shop and other buildings for the Polson Iron Works, recently damaged by fire. Some equipment will be replaced.

TORONTO, ONT. — The British Forgings Co., Ltd., plans to build a galvanized iron and frame factory to cost $5000 at 27 Atlantic avenue.

ST. JOHNS, N. B.—The Marine & Stationary Engine Mfg. Co., Ltd., will build a plant to cost $75,000.

WELLAND, ONT.—The Volta Mfg. Co. is in the market for a large radial drill.

MONTREAL, QUE. — The Eagle Smelting & Refining Works, Ltd., has been incorporated to manufacture and refine metals and conduct a foundry business with $40,000 capital stock. Peter Bercovith, Ernest Lafontaine and Nathan Gordon are the incorporators.

AMHERST, N. S.—Additions will be made to the plant of the International Engineering Works for which bids will be asked in the near future. Machinery and equipment also will be required.

New Trade Publications

MOTORS.—The second of a series of catalogs of motors was recently distributed by the Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa., devoted to the company's line of direct current motors and generators for industrial service.

Several pages in the fore part of the booklet presents general information regarding the ordering, classification and selection of direct current motors. This section is followed by descriptions and specifications for commutating pole motors, elevator motors, reversing planer motor equipment, headstock equipment for woodworking plants, motor generators and arc welding equipment. Especially interesting information is given on the subjects of arc welding, headstock equipment, motion picture service and battery charging service.

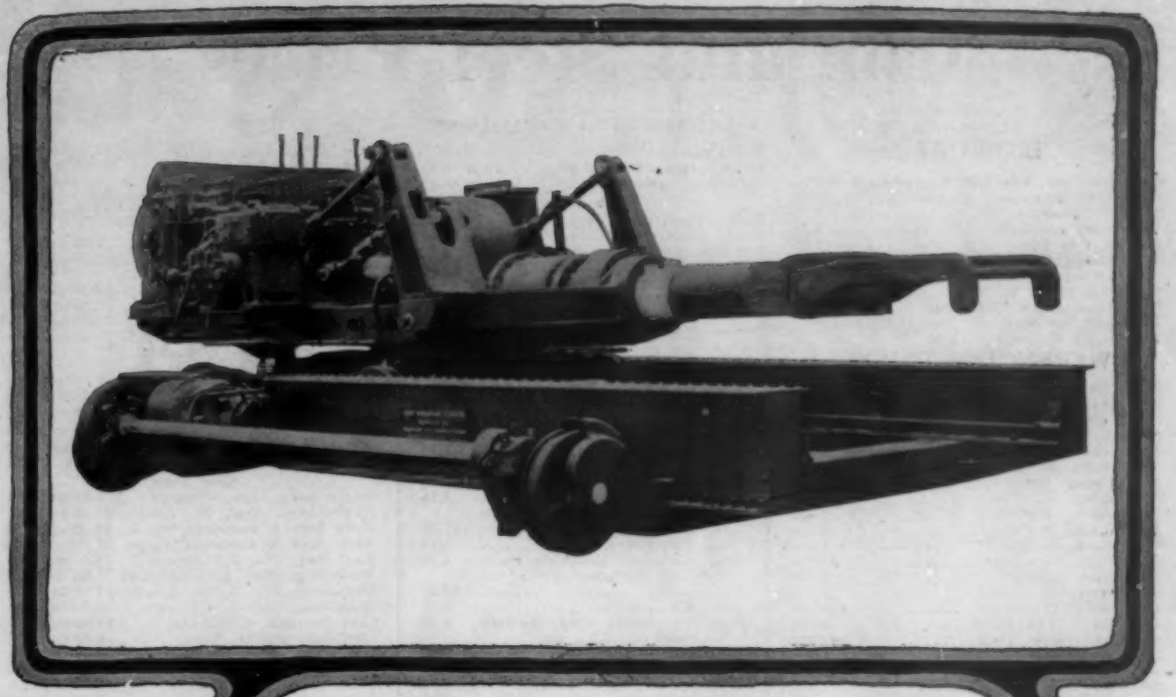
ALLOY-METALS.—In a catalog issued by the Goldschmidt Thermit Co., New York, metals used for alloying purposes are discussed. The Goldschmidt process by which these metals are obtained is said to give uniform results and to be of value owing to the facts that metallic oxides of known composition are mixed with a certain quantity of aluminum; that chemical reactions are always constant; consequently, that it is possible to compute results within close limits. Tests are said to have demonstrated that in a series of reactions, results scarcely vary more than ¼ per cent. In conclusion, several pages dealing with the adaptation of this process to foundry practice are added. This process supplies a means for increasing the temperature of iron and steel and for facilitating the introduction of other metals which it is desired to alloy for special purposes.

FLEXIBLE COUPLINGS. — An 8-page folder has been issued by the Thomas Flexible Coupling Co., Erie, Pa., describing single and double types of heavy and medium pattern flexible couplings. The couplings are said to be flexible in every direction; angularly, up, down, sidewise, endwise, without undue strain on any of their parts. The heavy pattern, double type couplings are built in sizes from ¾ to 16-inch shaft diameters, from 1 to 10,000 horsepower, and for speeds from 1 to 10,000 revolutions per minute. They permit an error of 6 degrees in shaft alignment and from 1/32 to 1/16-inch error in shaft centers. The medium pattern is made in the double type only and when used for a turbine coupling, allows independent endwise float of both shafts.

BALL BEARINGS.—A 52-page booklet describing ball bearings has been issued by the Transmission Ball Bearing Co., Buffalo. In the forepart of the booklet a history of the development of the Chapman type ball bearing is given. It is claimed that ball bearings with supported raceways are easily controlled, presenting none of the difficulties of end thrust and alignment; that they show a low coefficient of friction; and, when a sufficient factor of safety is allowed in design, they are said to have a long life. The Chapman bearing is designed to fit any standard hanger frame, intercharging with self-oiling boxes of the same shaft size. Sizes and maximum loads are given for light and heavy duty type of bearings. Together with shaft and ball-and-socket pillow-block bearings, the company manufacture bearings for exhaust fans, pressure blowers, industrial car wheels, power tables, etc. The last 19 pages are devoted to illustrations of various driving shafts equipped with the Chapman type of ball bearings.

CABLE-WAY CARRIAGES. — An 8-page folder describing a locking cableway carriage has been issued by the Blaw-Knox Co., Pittsburgh. The carriage enables the user to operate a clamshell bucket upon any ordinary cableway designed for hand-filled buckets, without changing the engine or running additional hoisting or holding lines; or, to construct a cableway upon which a clamshell bucket may be operated by an ordinary two-drum nonreversible hoisting engine. The carriage is locked fast to the supporting cable by means of a clutch that is kept in engagement by a spiral compression spring. The bucket may be raised or lowered, closed or opened, without moving the carriage, by pulling on the lines. When the carriage is to be moved, the bucket is lifted and hung on a hook pivoted to the carriage frame. The weight of the bucket then operates against the compression spring, releasing the clutch, and the carriage is free to move along the cable. To unhook the bucket, the slack is taken up on the closing line until the bucket is off the hook, whereupon the carriage is automatically locked to the cable. Slacking off on the holding line then frees the bucket from the carriage. The company furnishes these carriages for use on existing cableways, or for new installations.

CORE SAND MIXERS.—A 12-page booklet has been issued by the Blystone Mfg. Co., Cambridge Springs, Pa., describing a core sand mixer. The machines may be operated by either a 2½ or 3-horsepower motor at a countershaft speed of 150 revolutions per minute, or by hand. They occupy a floor space of 87 x 30 inches and have a capacity per batch of from 5 to 9 cubic feet. The material is mixed by shovels arranged in a reversed spiral form and attached at different angles to a common shaft. These shovels descend under the batch, turn it over and shovel it to the end of the mixing drum on the first half revolution of the shaft. On the second half-revolution, the reverse set of shovels again turns the batch over and shovels the material back to the opposite end. The shaft operating at 22 revolutions per minute conveys the material the full length of the drum 44 times each minute. All shovel blades are adjustable so wear can be taken up as it occurs. The open drum of the mixer enables the operator to see what is going on and when the drum is tilted to a dumping position the shovels remove the material. The mixer can be furnished with a screen, power discharge and electric motor. When the mixer is dumped mechanically, a lever connected to a double-disc clutch is thrown. This seats a plate in the disc which is fastened to the main mixing shaft, causing the drum to tilt.



Floor Type Manipulators

W-S-M Floor Type Manipulators are built to be the best on the market.

For handling wheels, blooms, slabs, billets, ingots, etc., during the process of manufacture, as well as manipulating materials at the presses, hammers, or mills, we firmly believe them to be unbeatable.

Revolving about vertical and horizontal axes the tongs are so designed that they will pick up material from the floor, car or roller table, making the machine adaptable for many purposes.

For Speed, Service and all-around Usefulness the W-S-M Floor Type Manipulator will answer every requirement.

The Traveling Wheel Blank Manipulator, with revolving trolley, illustrated above is one of several built for the Standard Steel Works Company, Burnham, Pa.

Principal Products of The W-S-M Company

Steel Plant Equipment:
Manipulators, Furnaces, Charging Machines, etc.
By-Product
Coke Oven Machinery.
Shipyard Cranes.
Hoisting and Mining Machinery.
Ore and Coal Handling Machinery.
Special Large Cranes.
Gas Producers, Gas Valves.
Hydraulic Turbines.
Johnson Hydraulic Valves.
Steel Castings.

WELLMAN SEAVER MORGAN COMPANY
CLEVELAND
OHIO U.S.A.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports.	
Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05
Port Henry Ores, non-Bessemer, Per Unit, Delivered Eastern Pennsylvania.	
Old Bed, crude 55 iron	10.50c to 11.00c
Old Bed., concent., 65 iron	11.00c to 11.50c
Harmony, concent., 63 iron	11.50c to 11.75c
Lump (at mines)	$5.75c

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.08½c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars Cincinnati	4.08½c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.18½c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.43c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, Cleve.	5.00c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., shets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.43c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.35c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.60c
No. 28 galv. sheets, Cinci.	6.65c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	8.00c
Hoops, Detroit	6.50c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$22.00 to 23.00
Bundled sheets, Cleveland	22.00 to 22.50
Bundled sheets, Buffalo	19.00 to 20.00
City wrought, short, N. Y.	26.00 to 26.50
Frogs, switches, guards, St. L.	29.00 to 29.50
Heavy melting steel, Pitts.	30.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	28.50 to 29.50
Heavy melt'g steel, Cleveland	30.00
Heavy melting steel, Cinci.	25.00 to 25.50
Heavy melting steel, east. Pa.	27.00 to 29.00
Heavy melting steel, N. Y.	26.00 to 26.50
Heavy melting steel, St. L.	27.00 to 27.50
Heavy melting steel, Birming.	21.50 to 22.50
Hydraulic press. sheets, Cleve.	25.00 to 25.50
Hydraulic press. sheets, Pitts.	24.00 to 25.00
Hydraulic press. sheets, Chgo.	26.00 to 26.50
Low phos. steel, Buffalo	40.00 to 42.00
Low phos. steel, Pittsburgh	38.00 to 40.00
Low phos. steel, eastern Pa.	35.00 to 37.00
Shoveling steel, Chicago	28.50 to 29.00
Shoveling steel, St. Louis	26.00 to 26.50
Steel rails, short, Chicago	34.00 to 34.50
Steel rails, short, Cleveland	31.00 to 32.00
Steel rails, short, St. Louis	36.50 to 37.00
Steel rails, old, Birmingham	28.00 to 30.00
Stove plate, Cincinnati	16.00 to 16.50
Stove plate, St. Louis	16.50 to 17.00
Stove plate, N. J. points	20.00 to 20.50
Stove plate, Birmingham	18.50 to 20.00
Stove plate, Buffalo	22.00 to 23.00
Stove plate, eastern Pa.	22.00 to 23.00
Stove plate, Cleveland	19.00 to 20.00
Stove plate, Pittsburgh	20.00 to 21.00
Cast iron borings	11.00 to 12.00

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	$21.00 to 22.00
Boiler plate, cut, No. 1, St. L.	19.50 to 20.00
Bundled sheets, Cincinnati	17.00 to 17.50
Knuckles, coup., Chicago	34.00 to 34.50
Knuckles, coup., St. Louis	30.50 to 31.00
Springs, Chicago	39.50 to 40.00
Stove plate, Chicago	19.25 to 20.25

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:	
Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54
Buffalo to:	
Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10
Virginia furnaces to:	
Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.32
Birmingham, Ala., to:	
Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40
Chicago to:	
Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54
Duluth, Minn., to:	
Minneapolis-St. Paul	$1.25
Mayville, Wis.:	
Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	16.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	17.0 cents
Chicago	21.5 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	79.0 cents
St. Louis	27 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	75 cents
Pacific coast (tin plate)	75 cents

IRON MILL USE

(Gross Tons)

Busheling, No. 1, Cleveland	25.75 to 26.75
Busheling, No. 1, Buffalo	26.00 to 27.00
Busheling, No. 2, Buffalo	17.00 to 18.00
Busheling, No. 1, Pittsburgh	21.00 to 22.00
Cast borings, New York	16.50 to 17.00
Cast borings, eastern Pa.	19.00 to 20.00
Cast borings, Cleveland	20.00
Cast borings, Buffalo	19.00 to 20.00
Cast borings, Pittsburgh	20.00
Cast borings, Birmingham	13.00 to 15.00
City wrought, long, N. Y.	31.00 to 32.00
Forge flashings, small, Cleve.	24.50 to 25.50
Forge flashings, large, Cleve.	24.00 to 25.00
Forge No. 1, Eastern Pa.	22.50 to 23.50
Grate bars, Buffalo	20.00 to 21.00
Grate bars, Cleveland	20.00 to 21.00
Grate bars, N. J. points	20.00 to 20.50
Iron axles, Pittsburgh	42.00 to 44.00
Iron axles, Cincinnati	42.00 to 42.50
Iron axles, Cleveland	49.50 to 50.00
Iron axles, eastern Pa.	50.00 to 55.00
Iron axles, Chicago	36.00 to 37.00
Iron rails, Chicago	38.00 to 39.00
Iron rails, Buffalo	37.00 to 38.00
Iron rails, Cincinnati	32.50 to 33.00
Iron rails, St. Louis	35.50 to 36.00
Iron rails, Cleveland	40.00 to 40.50
Machine turnings, Cleve.	20.00
Machine turnings, Buffalo	18.00 to 18.50
Machine turnings, N. Y.	16.00 to 16.50
Machine turnings, Pitts.	20.00
Machine turnings, east. Pa.	18.50 to 19.50
Machine turnings, Birming.	17.50 to 18.50
Pipes and flues, Cleveland	23.75 to 24.75
R. R. mch. cast, No. 1, Buff.	32.00 to 33.00
R. R. wrgt. No. 1, Buffalo	35.00
R. R. wrgt., No. 1, east, Pa.	35.00
Railroad wrgt., No. 1, Cleve.	35.00
R. R. wrought, No. 1, Pitts.	35.00
R. R. wrgt. No. 1, Birming.	28.00 to 35.00
Wrought pipe, Buffalo	26.00 to 27.00
Wrought pipe, eastern Pa.	30.00 to 32.00
Wrought pipe, New York	30.00

(Net Tons)

Angle bars, iron, Chicago	$37.00 to 37.50
Angle bars, steel, St. Louis	25.00 to 26.00
Arch bars & transoms, St. L.	42.00 to 42.50
Arch bars & transoms, Chgo.	37.50 to 38.50
Busheling, No. 1, Chicago	25.00 to 26.00
Busheling, No. 1, Cincinnati	21.00 to 21.50
Busheling, No. 1, St. Louis	22.50 to 23.00
Busheling, No. 2, Chicago	16.50 to 17.50
Cast borings, Cincinnati	13.00 to 13.50
Cast borings, St. Louis	16.00 to 16.50
Cast borings, Chicago	17.00 to 17.50
Cut forge, Chicago	29.00 to 29.50
Iron axles, St. Louis	44.00 to 44.50
Iron axles, Chicago	47.00 to 48.00
Machine turnings, Chgo.	17.00 to 17.50
Machine turnings, Cinci.	13.00 to 13.50
Machine turnings, St. L.	16.75 to 17.25
Pipes and flues, Chicago	22.00 to 23.00
Pipes and flues, St. Louis	21.50 to 22.00
Railroad wrgt., No. 1, Chgo.	31.25 to 32.25
Railroad wrgt., No. 1, Cinci.	28.50 to 29.00
Railroad wrgt., No. 1, St. L.	31.00 to 31.50
Railroad wrgt., No. 2, Chgo.	29.00 to 29.50
Railroad wrgt., No. 2, St. L.	29.00 to 29.50

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$23.00 to 24.00
Axle turnings, Buffalo	26.00 to 27.00
Shafting, New York	35.00
Shafting, eastern Pa.	38.00 to 40.00
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	46.00
Steel car axles, Buffalo	45.00
Steel car axles, Cleveland	46.00 to 47.00
Steel car axles, Pittsburgh	40.00 to 42.00
Steel car axles, eastern Pa.	50.00 to 55.00

(Net Tons)

Shafting, St. Louis	30.50 to 31.00
Steel car axles, St. Louis	42.50 to 43.00
Steel car axles, Chicago	43.50 to 44.50

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	30.00 to 31.00
Car wheels, (steel), Pitts.	33.00 to 35.00
Car wheels, eastern Pa.	33.00 to 35.00
Car wheels, Buffalo	33.00 to 34.00
Car wheels, Chicago	32.00 to 33.00
Car wheels, St. Louis	29.50 to 30.00
Car wheels, Birmingham	25.00 to 30.00
Car wheels, Cleveland	26.50 to 27.00
Tram car wheels, Birming.	21.00 to 25.00
Cast, No. 1, Birmingham	24.00 to 26.00
Cast, 1, machy., N. J. points	32.00 to 33.00
Cast No. 1, Cleveland	27.75 to 28.00
Cast, 1, heavy, N. J. points.	30.00
Cast, No. 1, eastern Pa.	31.00 to 33.00
Cast, No. 1, Pittsburgh	28.00 to 29.00
Malleable railroad, Cincinnati	20.50 to 21.00
Malleable railroad, Cleveland	27.00 to 27.50
Malleable railroad, Buffalo	31.00 to 32.00
Malleable railroad, Pittsburgh	28.00 to 29.00
Malleable railroad, east. Pa.	30.00 to 32.00

(Net Tons)

Cast, No. 1, Chicago	25.00 to 25.50
Cast, No. 1, Cincinnati	25.00 to 25.50
Cast, No. 1, St. Louis	21.50 to 22.00
Malleable railroad, Chicago	28.00 to 28.50
Malleable railroad, St. Louis	25.00 to 26.00
Malleable agricultural, Chgo.	23.50 to 24.50

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	$34.00 to 36.00
Reroll. rails, 5 ft. & ov., Chgo.	36.00 to 36.50
Reroll. rails, 5 ft. & ov., E. Pa.	37.00 to 40.00
Reroll. rails, 5 ft. & ov., St. L.	35.50 to 36.00
Reroll. rails, 5 ft. or ov., Cleve.	37.00 to 38.00
Rerolling rails, long, Birming.	37.50 to 38.50

(Net Tons)

Boiler punchings, Chicago	31.50 to 32.00
Locomotive tires, Chicago	36.00 to 37.00
Locomotive tires, St. Louis	32.50 to 33.00

THE IRON TRADE REVIEW

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No Price Change Jan. 1 Says Board

President is Advised of Decision of War Industries Board and is Expected to Make Quick Announcement—Operating Conditions Show Considerable Improvement—Mills Continue to Overtake Bookings

NO CHANGES are to be made dating from Jan. 1, in the present schedule of fixed prices for iron and steel products if the President follows the recommendations of the war industries board. The latter has laid before the chief executive its formal statement suggesting that the prevailing list of agreed prices be continued to March 31, 1918. At the same time, the federal trade commission has passed up voluminous data on comparative costs of iron and steel production for October and previous months. The President is expected to take this into account in making his final decision, which is expected to be announced quickly. The war industries board recommendation clears the air of many conflicting reports as to price action. Merchant pig iron producers at a meeting in New York within the week weighed the possibilities and the results of further reductions of prices and through a subcommittee filed a protest at Washington against the consideration of any statistical table in which steelworks and merchant furnace costs were mingled.

Announcement of a long list of additional prices, extras and differentials by the general committee of the American Iron and Steel institute practically has completed the schedule of iron and steel products in conformity with the previously fixed basis on mill and furnace material applicable to Jan. 1. The new recommendations include steel castings, cast iron pipe, track supplies, hard steel bars, forging bars, cut nails and other lines. Supplementary recommendations covering iron and steel scrap have been made. Schedules still to be fixed include principally hardware products.

Operations Picking Up

Operating conditions have improved somewhat, but they are far from normal, and now holiday interruptions have contributed their part to reduced production. Extra efforts have been made by the operators in the coke districts to make the Christmas lay-off as light as possible. The urgent need of energetic measures to re-establish production is to be found in the fact that Connellsville coke shipments last week were the smallest of any week in the year. Car supply averaged 50 per cent, but this week has been started off much more promisingly. The Carnegie Steel Co. has reduced its idle furnace list from 21 to 17. At Chicago, steelmakers may be obliged to bank several furnaces, as coal reserves have been exhausted. Some production of plates has been lost through eastern mills having been obliged to shut down due to coal shortages.

Deliveries Catch Up

Mills continue to catch up in their bookings in certain lines because of priority restrictions. This however, does not apply to plates and shapes, or to semifinished material where the war demands are running high. In bars conditions rapidly are reaching a stage where the buyer is having little trouble to get shipments. Some producers, as a result, more freely are taking forward contracts. Other large buyers are following a policy aimed to put their order books into the most liquid condition. Buyers have been asked to designate what tonnages they may be willing to receive at any time, even though some of these may have been bought for shipment as much as a year from this date.

Sell Iron for Future

Pig iron buying is moving more freely into the far extended periods. Contracts for the third quarter and last half of 1918 are more numerous. Southern makers have been taking more of this future business. Prices beyond July 1, 1918, generally, are not to be subject to any subsequent revision of fixed schedules. The heavy demand for basic is constant and some large new inquiries for the second quarter have appeared, including 40,000 tons for two consumers in Pennsylvania and Ohio. Steel Corporation subsidiaries, including the American Bridge Co. and the American Steel & Wire Co., have been seeking more steelmaking metal. Due to the more adequate coke supplies, pig iron production has been considerably increased during the week.

New Business in Eastern Canada

WASHINGTON.—The Fairbault Construction Co., 15 Park Row, New York, has received the contract for a 4-story, 138 x 320-foot, brick and concrete pattern shop and woodworking building to be erected at the navy yard.

GALT, ONT.—P. H. Secord & Son, Sydenham street, Brantford, Ont., have been awarded contract for the erection of an addition to the foundry of the Canada Machinery Corp. Concession and Water streets, to cost $30,000. A 25-ton crane will be installed.

GALT, ONT. — The Canadian Machinery Corp. will erect an addition to its plant at a cost of $30,000.

TORONTO, ONT.—The Bond Engineering Works, Ltd., is asking bids for the construction of an addition to its foundry on Villiers street, to cost $9000.

TORONTO, ONT.—The board of control has authorized the installation of air chambers at the main water works pumping station. Cost is estimated at $50,000. Bids will be received by the commissioner of public works.

TORONTO, ONT.—The Polson Iron Works has been severely damaged by fire Dec. 6, with a loss estimated at $250,000.

TORONTO, ONT.—The hydroelectric power commission will make extensions to the plant of the Ontario Power Co. to cost $1,000,000. Sir Adam Beck is chairman of the commission.

TORONTO, ONT.—Construction work will commence immediately on the erection of a new pattern shop and other buildings for the Polson Iron Works, recently damaged by fire. Some equipment will be replaced.

TORONTO, ONT. — The British Forgings Co., Ltd., plans to build a galvanized iron and frame factory to cost $5000 at 27 Atlantic avenue.

ST. JOHNS, N. B.—The Marine & Stationary Engine Mfg. Co., Ltd., will build a plant to cost $75,000.

WELLAND, ONT.—The Volta Mfg. Co. is in the market for a large radial drill.

MONTREAL, QUE. — The Eagle Smelting & Refining Works, Ltd., has been incorporated to manufacture and refine metals and conduct a foundry business with $40,000 capital stock. Peter Bercovith, Ernest Lafontaine and Nathan Gordon are the incorporators.

AMHERST, N. S.—Additions will be made to the plant of the International Engineering Works for which bids will be asked in the near future. Machinery and equipment also will be required.

New Trade Publications

MOTORS.—The second of a series of catalogs of motors was recently distributed by the Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa., devoted to the company's line of direct current motors and generators for industrial service.

Several pages in the fore part of the booklet presents general information regarding the ordering, classification and selection of direct current motors. This section is followed by descriptions and specifications for commutating pole motors, elevator motors, reversing planer motor equipment, headstock equipment for woodworking plants, motor generators and arc welding equipment. Especially interesting information is given on the subjects of arc welding, headstock equipment, motion picture service and battery charging service.

ALLOY-METALS.—In a catalog issued by the Goldschmidt Thermit Co., New York, metals used for alloying purposes are discussed. The Goldschmidt process by which these metals are obtained is said to give uniform results and to be of value owing to the facts that metallic oxides of known composition are mixed with a certain quantity of aluminum; that chemical reactions are always constant; consequently, that it is possible to compute results within close limits. Tests are said to have demonstrated that in a series of reactions, results scarcely vary more than ¼ per cent. In conclusion, several pages dealing with the adaptation of this process to foundry practice are added. This process supplies a means for increasing the temperature of iron and steel and for facilitating the introduction of other metals which it is desired to alloy for special purposes.

FLEXIBLE COUPLINGS. — An 8-page folder has been issued by the Thomas Flexible Coupling Co., Erie, Pa., describing single and double types of heavy and medium pattern flexible couplings. The couplings are said to be flexible in every direction; angularly, up, down, sidewise, endwise, without undue strain on any of their parts. The heavy pattern, double type couplings are built in sizes from ¼ to 16-inch shaft diameters, from 1 to 10,000 horsepower, and for speeds from 1 to 10,000 revolutions per minute. They permit an error of 6 degrees in shaft alignment and from 1/32 to 1/2-inch error in shaft centers. The medium pattern is made in the double type only and when used for a turbine coupling, allows independent endwise float of both shafts.

BALL BEARINGS.—A 52-page booklet describing ball bearings has been issued by the Transmission Ball Bearing Co., Buffalo. In the forepart of the booklet a history of the development of the Chapman type ball bearing is given. It is claimed that ball bearings with supported raceways are easily controlled, presenting none of the difficulties of end thrust and alignment; that they show a low coefficient of friction; and, when a sufficient factor of safety is allowed in design, they are said to have a long life. The Chapman bearing is designed to fit any standard hanger frame, intercharging with self-oiling boxes of the same shaft size. Sizes and maximum loads are given for light and heavy duty type of bearings. Together with shaft and ball-and-socket pillow-block bearings, the company manufacture bearings for exhaust fans, pressure blowers, industrial car wheels, power tables, etc. The last 19 pages are devoted to illustrations of various driving shafts equipped with the Chapman type of ball bearings.

CABLE-WAY CARRIAGES. — An 8-page folder describing a locking cableway carriage has been issued by the Blaw-Knox Co., Pittsburgh. The carriage enables the user to operate a clamshell bucket upon any ordinary cableway designed for hand-filled buckets, without changing the engine or running additional hoisting or holding lines; or, to construct a cableway upon which a clamshell bucket may be operated by an ordinary two-drum nonreversible hoisting engine. The carriage is locked fast to the supporting cable by means of a clutch that is kept in engagement by a spiral compression spring. The bucket may be raised or lowered, closed or opened, without moving the carriage, by pulling on the lines. When the carriage is to be moved, the bucket is lifted and hung on a hook pivoted to the carriage frame. The weight of the bucket then operates against the compression spring, releasing the clutch, and the carriage is free to move along the cable. To unhook the bucket, the slack is taken up on the closing line until the bucket is off the hook, whereupon the carriage is automatically locked to the cable. Slacking off on the holding line then frees the bucket from the carriage. The company furnishes these carriages for use on existing cableways, or for new installations.

CORE SAND MIXERS.—A 12-page booklet has been issued by the Blystone Mfg. Co., Cambridge Springs, Pa., describing a core sand mixer. The machines may be operated by either a 2½ or 3-horsepower motor at a countershaft speed of 150 revolutions per minute, or by hand. They occupy a floor space of 87 x 30 inches and have a capacity per batch of from 5 to 9 cubic feet. The material is mixed by shovels arranged in a reversed spiral form and attached at different angles to a common shaft. These shovels descend under the batch, turn it over and shovel it to the end of the mixing drum on the first half revolution of the shaft. On the second half-revolution, the reverse set of shovels again turns the batch over and shovels the material back to the opposite end. The shaft operating at 22 revolutions per minute conveys the material the full length of the drum 44 times each minute. All shovel blades are adjustable so wear can be taken up as it occurs. The open drum of the mixer enables the operator to see what is going on and when the drum is tilted to a dumping position the shovels remove the material. The mixer can be furnished with a screen, power discharge and electric motor. When the mixer is dumped mechanically, a lever connected to a double-disc clutch is thrown. This seats a plate in the disc which is fastened to the main mixing shaft, causing the drum to tilt.